FIELD MUSEUM OF NATURAL HISTORY

FOUNDED BY MARSHALL FIELD, 1893

DEPARTMENT OF ANTHROPOLOGY

GUIDE

PART 2

Archaeology of North America

HALL B (Ground Floor)

BY

PAUL S. MARTIN

ASSISTANT CURATOR OF NORTH AMERICAN ARCHAEOLOGY

8 Plates in Photogravure, 10 Text-figures, 1 Map

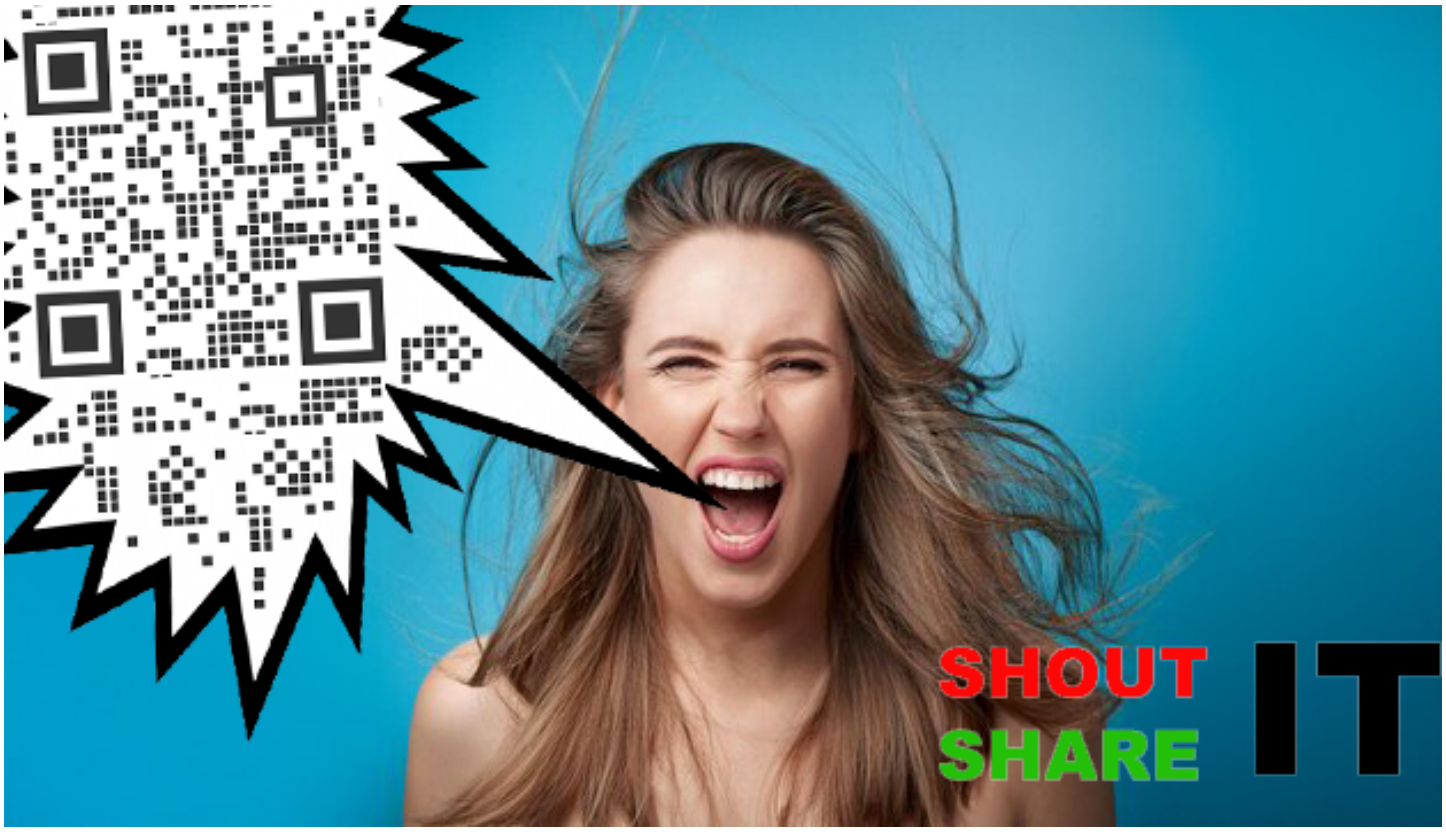
BERTHOLD LAUFER

CURATOR, DEPARTMENT OF ANTHROPOLOGY

EDITOR

CHICAGO, U. S. A.

1933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CONTENTS

		PAGE
I.	Origin and Antiquity of the American Indians	5
	Speculations concerning the Origin of the Indians	5
	The Origin of the Indians	7
	Antiquity of Man in the New World	11
II.	Culture Areas in North America	17
	Definition of Culture and Culture Areas	17
	List and Characterization of Archaeological Areas in North America	18
	1. Arctic Area	18
	2. Canadian or Northern Interior Area	21
	3. North Pacific Coast Area	21
	4. Columbia-Fraser Area	22
	5. Plains and Rocky Mountain Area	23
	6. Great Lakes and Upper Mississippi Area	24
	7. Iroquoian Area	26
	8. North Atlantic Area	28
	9. California Area	29
	10. Southwest Area	31
	11. Middle and Lower Mississippi Valley Area	31
	12. South Atlantic Area	33
	Summary	34
III.	Indian Mounds and Methods of Burial	36
	General	36
	Mounds of the Great Lakes Area	38
	Mounds of the Middle and Lower Mississippi Area	42
	1. Ohio	42
	2. The Cahokia Mound of Southern Illinois	45

3. Mounds of the Lower Mississippi Valley 46
4. The Etowah Mounds 47
IV. Manufacture of Stone Artifacts 49
Materials 49
Processes 50
1. Methods of Manufacture of Chipped Stone Implements . . 50
2. Manufacture of Axes 54
3. Manufacture of Problematical Objects 58
V. Mining, Manufacture, and Uses of Copper Implements and Ornaments 69
Mining 69
Manufacture of Copper Tools and Ornaments 72
VI. Bone and Shell Work 80
Bone Work 80
Shell Work 81
VII. Pottery 91
Distribution 91
Manufacture 92
Decoration 98
Pottery Types 100
VIII. Popular Fallacies concerning the American Indian 103
IX. Explanation of Hall of North American Archaeology 107
Glossary 111
Bibliography 113
By Authors 113
By Subjects 119
Index 121

ARCHAEOLOGY OF NORTH AMERICA

I. ORIGIN AND ANTIQUITY OF THE AMERICAN INDIANS

Speculations concerning the Origin of the Indians

Ever since Columbus discovered America and misnamed the New World aborigines "Indians," the question as to when America was first peopled has been of great interest to both students and laymen who have been and are studying the history of the American Indian. The term "Indian" although patently a misnomer is still so commonly used and properly understood that it seems preferable to continue its use rather than to substitute "Amerind" or any other term. Naturally, a subject which cannot be verified by documentary evidence has produced many theories, wild guesses, and endless speculations.

One of the first explanations of the origin of the American aborigine was that the Indians were the direct descendants of the Ten Lost Tribes of Israel. The exponents of this supposition stated that Sargon, King of Assyria (712 B.C.), captured and enslaved ten of the twelve tribes of Israel. In some unexplained manner some of the tribes became lost and eventually turned up in North America. The Book of Mormon, which is alleged to have been written by authority of direct revelation, contains several portions concerning the fancied relationship between the Ten Lost Tribes and the American Indians.

Another fantastic legend about the origin of the Indian is that of the "Welsh Indians." A Welsh prince, Madoc, sailed westward in A.D. 1170 and discovered a

new land. He returned to Wales, outfitted a second expedition, sailed for the new land, and was never heard of again. This story was seized upon, partly for political purposes, and embellished to prove that there existed a tribe of "Welsh Indians" who spoke Welsh and possessed Welsh Bibles brought to them by Prince Madoc. To substantiate this myth, the following story was invented. A certain preacher, Reverend Morgan Jones, was taken prisoner by the Tuscarora Indians and condemned to death. This worthy clergyman began to prepare himself for the next world by praying in Welsh. The Indians were amazed to hear him pray in their language, and when they discovered that he could not only speak their tongue but could also read their Welsh Bible, they released him!

No account of the legends concerning the origin of the Indians would be complete without mention of the story of the so-called "lost continent" of Atlantis. The proponents of this fable saw a fancied resemblance between the civilization of the Egyptians and that of the Maya Indians of Central America; and to explain this imagined similarity and the peopling of the New World, they revived the legend of the "lost continent" of Atlantis, which had been described by Plato, who probably had the island of Crete in mind.

Not to be outdone, the pan-Pacific enthusiasts concocted the unfounded story of the hypothetical continent of "Mu" which was supposed to have existed in the Pacific Ocean. Just prior to the "catastrophe" which caused "Mu" to sink, the "highly intelligent natives" had a premonition concerning the impending doom, and were wise enough to take to boats which finally drifted to the New World.

Still other professional guessers, seeking for a logical source for the Indians, have derived them to their own

satisfaction from the Egyptians, Greeks, Romans, Aryans, Japanese, Polynesians, Phoenicians, and Irish. Most of these hypotheses are based on flimsy and chance analogies in languages, arts, customs, elements of culture, and myths. Needless to state, all these ideas are pure fiction founded not on provable observations, but on superficial resemblances, worthless opinions, and arbitrary fancies.

THE ORIGIN OF THE INDIANS

Before any theories can be advanced concerning the origin of the American Indian, it is necessary to gather some facts, the first of which should be concerned with the question as to whether or not the Indians represent one or more racial stocks. The best available evidence comes from a detailed study of the identities and similarities of the body and skeleton. It is not possible here to enter into a detailed, technical discussion of this subject; but a few examples of the racial unity of the Indian may be given:

(1) Perhaps the most easily observable physical characteristic of the Indian is his hair, which tends generally in pure-bloods to be straight and black, and in cross section to be round. In this connection it is interesting to note that hair on his body and face is scant.

(2) His skin color is a yellowish brownish red.

(3) The nose is not so flat and broad as in Negroes, nor so thin as in whites; nor is the bridge so flat as in Negroes, nor so high as in whites.

(4) The cheek bones are generally prominent, which causes the face to appear broad in respect to the width of the head.

(5) The tibia and femur, the lower and upper leg bones, are flatter than those of most other races.

(6) The upper incisor teeth of more than 90 per cent of the Indians are concave on the inside with a pronounced border around the concavity.

There seems to be little doubt then, if any, that the modern Indians, physically at least, present many startling and fundamental parallels and counterparts and that they represent a single group of people, who show marked affinities with the Mongolians rather than with any other race; for certainly the Indian is not Negroid or Caucasoid. This does not mean that the Indian is Chinese; but it implies that there was, long ago, a proto-Mongoloid stem and from it branched on the one side the Mongolians (to which division belong the Chinese) and on the other the American Indians.

Recent studies by Dr. Hooton on a series of ancient skeletal material from Pecos, New Mexico, lead him to believe, however, that before the arrival of the Mongoloids in North America, there were a few straggling groups of long-headed, non-specialized people who drifted into this country from Asia. These earlier non-Mongoloid immigrants, who were absorbed by later invaders, present racial peculiarities different from those of the modern Indian.

Since there is not a shred of evidence for supposing that the American Indian originated in the New World and inasmuch as he belongs to the Mongoloid branch and is therefore Asiatic in origin, the question arises as to how and why he emigrated from Asia to the American continent.

With the limited and primitive methods of transportation at the disposal of prehistoric man, it is quite certain that he must have entered by the easiest and shortest route. The only region in the New World that lies in

close proximity to the Old is that which is adjacent to Bering Strait, for the least distance between South America and Africa is about fourteen hundred miles; and the distance between the closest Pacific islands and the west coast of South America is over two thousand miles. These great distances would have made it practically impossible for wanderers to emigrate to the New World unless by chance, or unless they were well equipped for a long voyage. Moreover, all the evidence at hand seems to indicate that the Pacific islands were settled only in comparatively recent times; perhaps a few thousand years ago. Therefore it is necessary to suppose that the peopling of the New World took place by way of Bering Strait, a channel of water about sixty miles wide, which separates Alaska from Siberia. It is possible that the original groups of settlers came across to the new land, parts of which may be seen on clear days from the Siberian shore, by boat or even on foot, because the strait freezes over a few months each year and crossing at that time on foot would be feasible.

In connection with this question of the peopling of the New World it is interesting to point out that Karl P. Schmidt of Field Museum of Natural History believes that, during the periods of great glaciation in Europe, part of the animal population retreated to southern Europe and part, by way of a route south of the Ural mountains, to northern Asia, which, with the exception of the mountains, was probably not glaciated. This wholesale migration to northern Asia was easily possible because of the east-west trends of the Eurasian mountain systems. It is likely that nomadic groups of Asiatic peoples were attracted to northern Asia because of the existence of this superabundance of game, which insured a steadier supply of food. Then when the ice

sheets receded, and the animals began to expand north, west, and east, man probably followed the chase, as many nomadic peoples do, and some groups may have surged up into northeastern Siberia. The reasons for emigrating were probably those which have reacted on man and beast alike for all times; namely, pressure from behind by other stocks, dissatisfaction, wandering propensities, or need for new hunting and fishing grounds. Once there, where food was more plentiful and climate more inviting, man stayed.

Naturally, it should be understood that the Americas were not settled within a short time or by one group of people. This immigration was a slow, prolonged dribbling and spread of successive waves of peoples. There was no mass migration.

As the people multiplied they spread ever east and south, and, when Columbus arrived, the greater part of both the Americas was well settled. The population of North America alone is estimated to have been about a million or a million and one-half.

Just how long it took these invading bands to spread all over two continents is not known. At first, it may have been a slow process; but as more arrivals drifted in the tendency was to push southward, since there was little, if any, resistance either at the gateway to the New World or to the south by established camps. It has been estimated that if a tribe of people moved camp but three miles each week, the southernmost tip of South America could be reached in about seventy years. Such an event probably never took place, but it is not necessary to postulate thousands of years of moving and multiplying to account for the spread and peopling of the New World.

ANTIQUITY OF MAN IN THE NEW WORLD

If man had existed in the New World for untold ages, it would be reasonable to expect to find human bones definitely and unmistakably associated with those of animals now extinct. In the Old World, for example, there are numerous sites which yield human bones and implements associated with animal remains of geological formations of undoubted antiquity; namely, those of the Pleistocene or glacial period. In the New World, no such associations of proven great antiquity have yet been discovered.

Many times in the last fifty years human remains together with some extinct animals were alleged to have been found in the New World. However, most of these discoveries have proved to be of such doubtful character that they are not generally accepted; or they had been disturbed and mixed to such an extent that by the time of discovery no definite evidence could be obtained.

Yet, even if human bones are found directly associated with animal bones, it is imperative to remember that such an association may have been brought about fortuitously; that is, by floods, which might wash together both recent and ancient forms of animal life and, after churning them about, deposit them in one bed or stratum; or certain hardy members of these now extinct species of animals may have outlived the other members of the group by many centuries. Such associations, therefore, may not be indicative of great age.

Plainly, therefore, it is not easy to state in absolute terms exactly when America was first peopled. However, there is some evidence at hand which will aid in making an estimate of man's antiquity in the New World.

The more recent history of man in the Old World, especially in Europe, goes back at least one hundred

thousand years. During this period of time cultures waxed, waned, and were superseded by others. With the aid of geologists and paleontologists, archaeologists have been able to assign relative dates to each of the identified periods. Thus, for example, it is possible to state approximately when polished stone weapons superseded unpolished ones; when horses, cattle, sheep, and pigs were first domesticated and wheat and barley were cultivated; when the wheel and pottery were invented, and the dates of their introduction and spread into various parts of the Old World. This group of elements or culture traits plus many more makes up what is known as the New Stone Age, which appeared in Europe about ten thousand years ago.

It is reasonable to suppose, then, if the first people who came to the New World knew of or possessed any of these aforementioned traits, that they would probably have brought some of this knowledge with them. But, what is actually found in the New World?

It is fairly certain that when man first entered this continent he brought with him the dog, harpoon, and fire drill, and the knowledge of making fire, of chipping and polishing stone implements, of primitive house-building, of basket-making, and probably of the spear-thrower.

It is very significant that in the New World there is no trace of any of the fundamental traits of Asiatic civilization. For example, in Asia, agriculture was practised by means of the plow and the ox as draught-animal; in America, where the plow was unknown, it was carried on by means of planting sticks and hilling. All Old World domesticated animals, such as the ox, horse, camel, reindeer, sheep, goat, pig, and chicken are absent in the New World, the dog, the turkey, the llama, and the

guinea pig being the only domesticated animals of the Indians. Wheeled chariots, the potter's wheel, stringed musical instruments, roofing tiles, and the art of smelting, forging, and casting iron are strictly lacking in aboriginal America.

Not a single Old World cultivated plant, such as wheat, barley, oats, rice, soy bean, alfalfa, peach, apricot, and onion ever found its way into America prior to 1492. Significant, too, is the fact that all American plant cultivations, such as Indian corn or maize, potato, tobacco, pineapple, guava, papaya, Capsicum, peanut, cashew, tomato, and many others, were derived from wild American native plants, and none of the American cultivated plants occurred in the Old World before the discovery of the New World.

Plainly, then, this mass of evidence indicates that many thousands of years ago American and Asiatic cultures separated and have since developed independently, and that man must have entered the New World before these Old World specializations were commonly known or before they were widespread, which was about ten thousand years ago.

We must not believe, however, that after the New World was populated it marched along in splendid isolation without receiving certain Asiatic traits from time to time through the agency of diffusion. It seems certain that the following traits found in portions of the New World are directly due to Asiatic influences: shoulder blade and water-gazing divination, worship of the bear, shamanism, the composite bow, the moccasin, ivory carving, and many folk tales.

However, practically all the other cultural traits and advances which the Spaniards found when they first

entered and explored America were invented, discovered, or developed in the New World independently of the Old World.

Moreover, as stated before, if men of the Old Stone Age had lived in America, one would naturally expect to find their fossil remains or their implements. Nevertheless, no fossil man from an unquestionably ancient geological era has ever yet come to light in the New World; nor have any bones of any extinct species of man ever yet been discovered anywhere in the Americas.

Recently, however, in southwestern New Mexico, at Bishop's Cap Peak, R. P. Conkling has discovered new evidence concerning man's antiquity in the New World. Likewise, under the direction of field parties from the Colorado Museum of Natural History and the American Museum of Natural History in New York excavations have been carried on at Folsom, New Mexico, which turned up stone projectile points of an unusual type associated and in close contact with bones of an extinct species of bison.

In Gypsum Cave in southwestern Nevada Dr. Harrington, who was in charge of a joint expedition from the Southwest Museum of Los Angeles and the California Institute of Technology, found evidence indicating the association of man and three extinct species of animals: a great ground sloth, one of the indigenous American camels, and the horse. This evidence consists of dart points, pieces of worked cane, arrow or dart shafts, and two camp fires and fire pits. Sloth dung had been used as fuel, and the fire pit lay under a consolidated and undisturbed stratum of sloth dung. Fortunately, these discoveries were made by trained experts, who meticulously collected and recorded all the data.

The dating of this evidence is, naturally, important, interesting, and difficult. It was formerly thought that certain sloths, camels, horses, and certain types of bison had become extinct fifty thousand to one-half a million years ago. But much information concerning this subject has recently come to light, so that now many paleontologists feel that the time of the extinction of these animals must be placed considerably later than was formerly thought possible. Therefore, the undoubted associations of man with extinct species of bison, sloth, and horse do not necessarily imply any great antiquity.

Thus, the date of entry of the Indian to the New World may be only approximately fixed as coming before the New Stone Age was well under way in the Old World, and prior to the extinction of certain American fauna, such as ground sloths, the native camels, and a species of bison; in other words, probably considerably less than twenty-five thousand years ago. There are many die-hards who, even after all this evidence has been presented, will still argue that the Indians must have inhabited the New World for hundreds of thousands of years. Their argument runs something like this: the civilizations of the Mayas, Aztecs, and Peruvians were highly developed; such a remarkable rise in culture must have taken fifty to one hundred thousand years; therefore, the Indians have occupied the New World for that length of time or longer. Such reasoning lacks logic and collapses immediately upon close investigation. It is known from recorded dates that some of the most advanced civilizations in Mesopotamia, starting from a fairly primitive agricultural level, waxed and waned within a maximum period of from three to four thousand years. That of Egypt also rose from a primitive agricultural status, flourished and

declined within the comparatively short period of about three thousand years.

Assuming that the highest American civilizations required an equal length of time for their remarkable growth and development from lowly agricultural foundations, it is plainly not necessary to suppose that they needed many thousands of years for their development or that they are very ancient.

II. CULTURE AREAS IN NORTH AMERICA

Definition of Culture and Culture Areas

The word "culture" as used by anthropologists does not mean the improvement and refinement of the mind, an action which implies a conscious, voluntary effort. Culture in an anthropological sense embraces the sum total of human behavior and activities which are handed on by precept, imitation, and social heritage. This would include all customs, habits, usages, attitudes, beliefs, religious and political ideas, and material products, such as methods of building houses, of manufacturing all kinds of artifacts (weapons, pottery, ornaments, baskets, cloth), of planting and harvesting, and so on. In short, culture means everything man creates, imagines, thinks about, and hands on to the next generation. This definition implies group participation and continuity. A chimpanzee, for example, may learn to make certain movements to obtain food and thus may attain some individual cultural habits, but since he is unable to pass on what he has acquired, it may safely be said that chimpanzees possess no culture. Culture as here defined involves no conscious effort on the part of the individual or the group, but is rather unconscious or naïve.

When a culture becomes complex and advanced, especially in a material way, it is customary then to refer to it as a "civilization," such as the Maya civilization; but in reality culture covers all the elements of civilization and does not necessarily connote any degree unless the term "high" or "advanced" culture is used.

Naturally, in dealing with North American archaeology, it is the material part of any culture that remains for study, since no one knows exactly what political, social, or reli-

gious ideas the prehistoric inhabitants held. Therefore, it has been customary to divide North America into twelve culture areas or regions, each of which presents so many cultural traits peculiar to itself as to contrast it with or set it off from the other culture areas. These traits, for example, might include pottery, weaving, stone, copper and wood artifacts, burials, and houses. The borders for each area are rather indefinite, since one culture may blend with a neighboring one without regard for modern state or political boundaries.

It should be clearly understood that the various cultural traits which will be outlined on the pages to follow are not all of the same age, but represent probably many different ages or periods. For example, in the Great Lakes area, copper artifacts, together with problematical objects (banner-stones, boat-stones, gorgets, and so on), occur in the same region as the burial mounds; but this does not imply that the copper artifacts and the problematical objects were manufactured at the same time that the mounds were erected. In point of fact, some of the mounds are probably older than either of the other two traits mentioned. Therefore, the concept of the culture area merely describes what is found therein, and does not necessarily yield any historical or chronological clues.

LIST AND CHARACTERIZATION OF ARCHAEOLOGICAL AREAS IN NORTH AMERICA

A list of the twelve North American culture areas with some of their prominent and distinctive traits is as follows. Each area bears a number which corresponds to the one on the map (p. 19).

1. ARCTIC AREA

This area covers all the northern edge of the North American continent from Greenland to Alaska and seems

to contain what was a fairly uniform culture, essentially Eskimoan except where Athapascan or northern Algonkin tribes affected it. But little archaeological work has been done in this region, and, so far, all evidence indicates that

Culture Areas of North America in Prehistoric Times. After Wissler. For explanation see pages 18–34.

the culture in prehistoric times was practically the same as it is at present. For example, the ancient houses, methods of burial, and artifacts uncovered by archaeolo-

gists are similar to those used by the modern Eskimo who have not yet been affected by European contacts.

The climate in the Arctic area is everywhere harsh, cold, and damp. Some sort of shelter, then, is almost a necessity. Great ingenuity was displayed by the Eskimo in utilizing the scant building material at hand for house-building. Houses were constructed from driftwood, whale-bone, stone, snow, and earth. A permanent type of shelter was devised which was serviceable and warm. The floor in the houses was dug some eighteen inches or more below the natural level and a passageway or entrance, which functioned both as a "hall" and entryway, was effective in keeping out wind and snow when the house was entered. Heat and light were furnished by flat stone lamps, the only place in aboriginal America where lamps were used; and fat or oil was burned, since there was little or no fuel of any other kind. The tools which were used in daily life were made of ivory or bone, often beautifully ornamented, and present a high degree of inventiveness.

In some places stone was pecked, chipped, and polished to make adzes, chisels, picks, knives, dishes, and sinkers, but grooved axes and celts were practically never manufactured by the inhabitants of this region. Stone ear-plugs, lip-plugs, beads, and pendants were skillfully and beautifully fashioned, chiefly from jade, and a crude, heavy type of pottery was used in the western portion of the area.

The Arctic area displays a fairly high culture considering the frigid environment and the lack of natural facilities. The Eskimo, who probably inhabited most of this region, were the last to enter the New World, and, since all the territory to the south was occupied, were forced to remain in what appears to be a most unattractive region and to make many adaptations to the arctic climate.

2. CANADIAN OR NORTHERN INTERIOR AREA

Practically no archaeological work has been done in this region, and for that reason little is known about it. However, it may be said that the modern Indians who inhabit this great territory—the Athapascan and the northern Algonkin tribes—are hunters, and probably their culture, as it was first observed, is very much the same as that of prehistoric times. The culture seems to have been very meager indeed, and all one finds on old camp sites are arrowheads and spearheads, knives, scrapers, hammerstones and boiling stones.

3. NORTH PACIFIC COAST AREA

The territory inhabited by the north Pacific coast peoples comprises the long, narrow strips of mainland and the adjacent islands from Puget Sound to Mount St. Elias in southern Alaska. The mountains of this region descend almost to the coast line, and the area as a whole is densely forested.

The culture of the north Pacific coast Indians, as first observed by Europeans in the seventeenth century, was probably much as in prehistoric times. For that reason a description of the culture of the modern groups, except where modified by European contacts, would hold also for the prehistoric cultures. Agriculture was not practised. Food consisted of fish, shellfish, eel grass, seaweed, berries, seeds, and bulbs.

Perhaps the most prominent features of this coastal culture were those of wood-working and carving. These people were inveterate wood-workers. Almost every conceivable sort of object was fashioned from wood. For example, canoes nearly a hundred feet long were made from the trunks of red cedars. Cedar wood was also employed for paddles; totem poles; boxes for cooking (by

means of hot stones, as pottery was unknown); boxes for water vessels, for storage, and for burial; dishes; spoons; and clubs. They also used wood for traps, dams, digging sticks, roasting tongs, bows and arrows, cradles, and houses.

Wood-working tools, which were ground and polished rather than chipped, were therefore a necessity, and were as ingenious and utilitarian as they were plentiful. Great slabs and planks were split off from live, standing trees by means of stone wedges and fire. Adzes made of stone and grooved for hafting were employed for smoothing planks. Stone chisels, sometimes hafted with bone or wood, were used for thinning and smoothing. Hand hammers, likewise of stone, and resembling pestles, served for driving chisels and wedges. Pile drivers of stone, often covered on one side and weighing from twenty to fifty pounds, were used for driving deep into the river bed wooden piles for the construction of fish weirs or for the attachment of fish nets. In addition to these tools, stone mortars, pestles, knives, clubs, and mauls abound, although chipped stone objects and stone axes are rare.

The artistic abilities of these people were not confined, however, to wood-working and carving, but were displayed in an exuberant manner in minor works of stone, copper, horn, bone, shell, and ivory. This culture, sometimes known as the "cedar and salmon culture," was extremely virile and entirely different from any other American culture.

4. COLUMBIA-FRASER AREA

The culture of this area, although the climate is varied, is fairly uniform and displays some influence from California and the Plains. Perhaps the most conspicuous features are the abundance of chipped stone artifacts, such as arrowheads and spearheads, drills, knives, and

scrapers, and the rarity of ground and polished stone objects. In addition to these objects, archaeologists have uncovered the following bone artifacts: digging-stick handles, awls, clubs or swords, tubes, needles, fishhooks, and gaming pieces; and the following stone artifacts: arrow-shaft smoothers, dishes, mortars, pestles, mauls, clubs or swords, pipes, girdled sinkers, and wedges. No grooved axes, however, have been found.

The peoples of this area never practised agriculture or manufactured pottery, but subsisted by fishing, hunting, and gathering seeds, nuts, and roots. Still to be seen are the ancient circular house pits, from one to three feet deep, thirty or forty feet in diameter, and outlined by elevated rims of earth or stones.

5. PLAINS AND ROCKY MOUNTAIN AREA

As indicated, this area embraces the western portions of North and South Dakota, Nebraska, Kansas, Oklahoma, Texas, the greater part of Colorado, Utah, and Nevada, and all of Idaho, Montana, and Wyoming. It is surprising that so little is known of this important region, but so far little systematic work has been carried on. Perhaps the prominent feature of this area is its lack of any group of striking characteristics. Naturally, some influences from the surrounding cultures are found on the borders; but they quickly fade out as one approaches the heart of the area. Agriculture, with certain exceptions, was not practicable except in the eastern portion of the area and even there, where distances between streams and lakes are relatively great, it is probable that the inhabitants were nomadic in the fall, winter, and early spring, and sedentary during the remainder of the year.

Several large flint quarries have been found in Oklahoma, Kansas, and Texas, while soapstone and quartzite

were quarried in Wyoming, and obsidian in Yellowstone Park. The commonest stone artifacts include arrowheads and spearheads, knives, scrapers, and grooved hammers. Pottery is found on the eastern and southern edges, and in the central portion of the area. Scattered throughout the area are circles and lines of boulders. It is assumed that the circles mark old house or tipi sites, while the long lines of stones are said to be markers for buffalo grounds. In the extreme southern part of the Plains area in Texas are found numerous kitchen middens which are the remains of a hunter culture; and along streams are camp sites of a superior culture. Evidences of the Basket-maker culture of the Southwest have been uncovered in caves of western Texas and Oklahoma. As more investigations are carried on in this great area, significant differences probably will be revealed and more light shed on the peoples who lived there at various times.

6. GREAT LAKES AND UPPER MISSISSIPPI AREA

The culture traits of this area do not sharply differentiate it from the neighboring areas; but there are four features at least that appear in portions of the Great Lakes and Upper Mississippi region that make this division justifiable.

The first of these features is the well-developed copper industry. Only a brief mention of it is necessary here, because the subject is fully discussed in another chapter (p. 69). Suffice it to say that copper objects abounded, especially in Wisconsin, and comprise harpoons, fishhooks, crescent-shaped and long-bladed knives, chisels, arrowheads and spearheads, gouges, beads, pendants, axes, awls, and punches (Plates V, VI).

The second of these features is the unique effigy-mound culture. Effigy-mounds, so-called because they

are constructed in the form of animals and birds, are found particularly in southern Wisconsin. A few occur in the contiguous areas of northern Illinois, northeastern Iowa, and southeastern Minnesota. These effigies were built as though seen either from above or in profile and include such shapes as bears, panthers, birds, and various other puzzling forms (for more information see p. 38).

The third of these features is the use of catlinite or pipe-stone which was quarried from a mile-long narrow outcrop in Pipestone County, southwestern Minnesota. Catlinite, named after George Catlin, an early American writer on Indian subjects, is a soft red or light-colored slate formed from clay. Because it was so readily worked, catlinite was extensively used for pipes, ornaments, and problematical objects. These manufactured articles are found over this entire area, in spite of the fact that the source of catlinite is limited to a very small region.

The fourth of these features is the novel and mysterious construction of "garden-beds," peculiar to Michigan. These garden-beds are of various sizes and shapes, covering sometimes as much as one hundred acres. They may be described as ridges or rows of dirt from eighteen to thirty inches in height which were laid out in some geometric form, either rectangular, with parallel ridges crossing one another and resembling most the gridiron plan of a modern city, and also with straight or convex rows, sometimes with a path between the rows and sometimes not; or circular, with variously curved avenues or paths between the rows. For what purpose these garden-beds were used is not known. Maize was generally planted in hills, not in rows; but it is within the realm of probability to consider them as having some connection with agriculture. These beds have all been destroyed but were seen and described by explorers of the early nineteenth century.

In addition to these four peculiar features, this area has yielded numerous artifacts such as grooved axes, tobacco-pipes, drills, arrowheads and spearheads, mortars and cylindrical pestles, adzes, celts, many problematical forms, and pottery. Peculiar to Wisconsin are the fluted axes, which are characterized by the flutings or grooves and which run longitudinally from just below the handle socket to within a short distance of the cutting edge. Agriculture was carried on in favorable localities, but hunting, fishing, and seed-gathering were likewise important factors in the culture.

7. IROQUOIAN AREA

This culture area comprising the regions about Lakes Erie and Ontario, which is the smallest of all the North American areas, is often included in the Great Lakes or North Atlantic areas. However, there are evidences here of at least two occupations, Algonkin and Iroquoian, the last of which was that of the Iroquois Indians. Therefore it seems best to set this region off by itself and to present the distinguishing characteristics. In the following paragraphs are given separate lists of artifacts peculiar to the Algonkins and to the Iroquois, together with a list of objects common to both.

The Algonkins were preeminently stone-workers. Excavations of their villages have brought to light the following: several types of arrowheads and spearheads; ground slate arrows, knives, "bayonets," and semilunar knives; cylindrical pestles; gouges; grooved axes; and problematical stones, such as gorgets, banner-stones, bar and bird amulets, and boat-stones. Copper objects, which resemble those from Wisconsin, are frequently found, but it is not certain whether they were manufactured by the Algonkins or by other tribes. Pottery

found on Algonkin sites was made in two ways: by the coil and by the paddle and anvil methods. These two processes of manufacturing pottery are explained in the chapter devoted to ceramics (p. 91). The Algonkin pottery shapes are usually globular with pointed bases and either constricted or flaring at the mouth. In general this pottery is crude and inferior to Iroquoian work. Artifacts of bone, antler, teeth, and shell are extremely rare at Algonkin sites.

The Iroquois, on the other hand, while less skillful and less interested in chipped stone-work, produced fine bone and antler artifacts. A partial list of Iroquoian artifacts would include: arrowheads, especially the small triangular type; stone mullers or millstones; stone and pottery tobacco-pipes, the latter type displaying barrel-shaped, urn-shaped, ovoid and trumpet-shaped bowls.

The Iroquoian pottery was all made by the coil process and is differentiated from the Algonkin by its overhanging rim. It is elaborately decorated with geometric designs produced either by stamping or punching methods. As noted above, bone, antler, teeth, and shell artifacts are common, and include arrows and harpoon points, fish-hooks, mattocks, chisels, adzes, and combs.

The following artifacts are rare or absent at Iroquoian sites: stone spearheads, slate arrows and knives, stone gouges, grooved axes, problematical objects, and copper artifacts. Common to both Algonkin and Iroquoian cultures are stone arrowheads, drills, scrapers, mortars, adzes, and celts.

Exact knowledge of the type of shelter characteristic of the Algonkin culture is lacking, but there is some evidence for believing that it consisted of an earth-covered, dome-shaped hut built over an excavated pit. The houses of the Iroquois were bark-covered community lodges,

housing from five to twelve families, and built within stockaded defensive walls.

Agriculture was extensively practised by the Iroquois, but was apparently not carried on by the Algonkins.

8. NORTH ATLANTIC AREA

The North Atlantic culture area is commonly divided into two sub-areas: (1) the southern portion, which includes the territory from the Delaware River with an indefinite western termination at the Maine–New Hampshire boundary; (2) the northern sub-division, which comprises all of New England and the Maritime Provinces of Canada.

The southern sub-area, the center of which is in New Jersey, may be characterized as consisting of village sites with numerous storage pits, pottery of Algonkin and Iroquoian types, shell-heaps in which are found very few specimens, and abundant, well-worked artifacts of stone, including grooved axes, rounded celts, pestles, problematical forms (gorgets, banner-stones, bird-shaped stones), and chipped stone implements such as projectile points, drills, knives, and scrapers. Agriculture was important.

In contrast with the southern area, the northern sub-division contains relatively few village sites, while shell-heaps are large and numerous, and harbor an abundance of artifacts. There is no evidence of agriculture and little of settled village life.

Within the northern sub-area are the remains of two cultures—the Red-paint culture, which is the earlier, and the shell-heap culture.

The Red-paint culture, so named because it was an ancient custom to place quantities of red ochre with the cremated burials, is found for the most part along the

river valleys of Maine. In these burial sites are found long, slender, stone celts, stone gouges and adzes, slate arrowheads, and slender slate "bayonet points," stone crescents, semilunar stone knives, stone tubes, stone plummets, and long stone pendants. Pottery, grooved axes, and problematical stones are absent. This early pre-pottery culture does not seem to be related to the Eskimo culture, but there is good evidence for believing that the Red-paint people were affiliated with an Algonkin tribe, the Beothuk Indians of Newfoundland, who were exterminated by the white settlers in 1829.

The shell-heap culture differs considerably from the Red-paint culture because of the presence of the following objects: grooved axes, angular celts, stone and pottery pipes, chipped implements (arrowheads and spearheads, knives, drills, and so on), bone awls, arrow points, fish-hooks, harpoons, flaking tools, and ornaments. Slate objects are lacking. The pottery is coarse and heavy and has a rounded base, rather than the conical or lemon-shaped base of the Algonkin type.

9. CALIFORNIA AREA

The California culture area has been sub-divided, on the basis of archaeological work, into three sub-areas: the Southwestern, the Central, and the Northwestern.

The Southwestern sub-area, which consists of the Santa Barbara Islands and the mainland adjacent to the Santa Barbara Channel, is noteworthy because of its wealth of antiquities. It is characterized by an abundance of shell ornaments, such as disk, globular, and tubular beads; steatite or soapstone bowls, used for household and burial purposes; baking slabs; digging-stick weights; tubular pipes; shell fishhooks; knives and scrapers of shale; bone awls; harpoons; whistles; whalebone wedges and

chisels (since the stone ax and celt were foreign to California); clubs; well-chipped flint implements; and mediocre pottery.

The Central sub-area shows less specialization and fewer unique types than the Santa Barbara region. A list of the most distinctive artifacts comprises stone mortars and pestles; concave shell beads; plummet-shaped sinkers or charm stones; curved and serrated obsidian blades; narrow high cylindrical vessels of soapstone; arrow-shaft straighteners; and salmon-grease dishes.

The Northwestern culture has for typical artifacts wedge-mauls with knobbed or flanged heads, stone pestles tapering gradually to a point with a flange near the base, perforated net-sinkers, pointed bone implements, obsidian blades ranging in size from a few inches to three feet in length, flint knives which were hafted, slate "slave-killers," two-horned mullers, tubular tobacco-pipes of soapstone, and non-portable mortars excavated from bedrock. It should be noted that the grooved stone ax, celt, and gouge were foreign to California.

Agriculture was never practised in aboriginal California, although the inhabitants were sedentary, not nomadic. Wild vegetable products such as berries, seeds, and acorns especially, together with wild game and fish, provided the necessary foods.

The permanence of California culture is the most important single contribution to the history of civilization that the study of aboriginal California yields. There are few places in the world where the basic ideas underwent so few changes, for the natives traded the same materials, ate the same food, sewed skins and rush mats, and coiled baskets two or three thousand years ago as do their modern descendants. The fundamentals of these cultures remained immutable.

10. SOUTHWEST AREA

The culture developed within this area (Utah, southern Colorado, New Mexico, Arizona, western Texas, and northern Mexico) was the highest and most advanced of any in North America. It is hoped that this area will be dealt with in detail in a guide to Southwestern Archaeology and Ethnology (Hall 7).

The culture of the Southwest, sometimes known as the Pueblo culture because the people lived in large villages, has been divided into three main periods and several sub-divisions: (1) the Basket-maker or pre-pottery period; (2) the Pueblo period, during which time large stone houses and excellent pottery were developed; (3) the modern period, dating from 1700 to the present. Southwestern cultural influence spread into the adjacent Plains area and over into southern California.

11. MIDDLE AND LOWER MISSISSIPPI VALLEY AREA

This area, which includes especially the drainages of the Ohio and Arkansas Rivers, contains more mounds on the square mile, and larger mounds, than any other North American area. For that reason it is often called the "mound area," although, strictly speaking, mounds are found in many other areas, notably the Great Lakes area. It must not be assumed, on the one hand, that all mounds were built at the same time, or, on the other, that any great age can be claimed for the mounds. More details about the mounds may be found on page 42.

Although ordinarily this area is considered as a unit, in reality there are several centers of specialization. As yet no one center may be regarded as typical. Archaeological work has proved that there are many elements which are common to the area as a whole. Likewise, certain phases of this Middle and Lower Mississippi

Valley culture blend imperceptibly with the cultures to the north and the southeast.

In the southern portion of this area pottery was well made, and is perhaps one of the salient characteristics of the region. This pottery was painted as well as incised with designs, and often represents animal and human shapes (p. 100, Plate III).

The range of stone artifacts is greater than in any other North American area. The following list bears out this statement: mica ornaments; sword-like blades; discoidals or "chunkey stones"; obsidian implements, although obsidian does not occur anywhere in the region; problematical objects; tobacco-pipes; chert agricultural implements; numberless chipped implements, such as drills, arrowheads and spearheads, scrapers, axes, celts, chisels, and adzes; and a cache of more than eight thousand large flint disks or blanks.

Copper, especially in Ohio, was likewise worked in a remarkably skillful manner; but the copper artifacts of this area differ sharply from those found in Wisconsin, for these examples include copper head-dresses representing antlers, copper breastplates, copper ear ornaments, copper bracelets, copper beads, and copper effigies (Plate II). Carved bone, shell, and stone ornaments of beautiful and delicate workmanship are of frequent occurrence and in some instances seem to show evidence of art influence from Mexico (Plate VIII).

An important and famous local development within this large area centers in Ohio. Among its characteristics may be listed numerous and great earthworks or mounds, including the Great Serpent Mound, and a remarkable esthetic development which found expression especially in creating artifacts and ornaments of stone, bone, wood, copper, and mica.

12. SOUTH ATLANTIC AREA

This area includes the southeastern part of Georgia and all of Florida. The culture differs sharply from that of the North Atlantic area, but merges almost imperceptibly with that of the region to the west, that of the Lower Mississippi Valley area.

Perhaps the salient feature of this area is the abundance of large shell-heaps located along the Atlantic and Gulf coasts, which bear witness to the fact that, although agriculture was practised somewhat, the chief source of food came from the rivers and the sea. Many of these shell-heaps have never been disturbed, while others have been utilized secondarily as sites for dwellings and defence.

Burials were usually made in earth or sand mounds and, in contrast to those of the North Atlantic area, are accompanied by many objects such as pottery figures and pottery vessels. Some of the latter were often "killed" (bottom of pot intentionally perforated), while others, specially made in advance with perforations and holes, served only as mortuary vessels or offerings. Five forms of burial existed: extended (body at full length); flexed (knees drawn up toward chest); exposure until flesh and soft tissues decomposed and then bones interred; cremation; and urn burial (bones or remains of cremation placed in large urn).

Along the Gulf coast, houses were built on piles. In other localities they were built of poles and thatch and placed within a defensive palisade.

Archaeological work has revealed many other phases of this culture, such as carved stone bowls; stone plates or dishes; shell hoes; pottery tobacco-pipes of angular trumpet shapes with effigy bowls; unpainted pottery of effigy shapes or with stamped and incised designs, mostly

curvilinear; wooden masks; figurines and dishes, all well carved; chipped flint implements, especially from the northern part of the area; gold, silver, and copper ornaments, some of which were undoubtedly manufactured within the southern part of the area; and hoe-shaped stone implements, resembling a form prevalent in South America. The grooved ax is extremely rare. Celts occur in large numbers and correspond in shape and size with those found in the West Indies. There is some evidence in the gold work, in the pottery designs, in some of the stone and wooden artifacts, and in the type of house, that the prehistoric culture of Florida was influenced by that of the West Indies and the northern part of South America.

SUMMARY

From this welter of facts concerning archaeology and from many more not given here pertaining to the living Indians, it is possible to bring order out of apparent chaos. By a thorough analysis and comparison of all North American culture traits, the twelve large and seemingly disconnected and unrelated culture areas may be reduced to three fundamental or principal culture centers; namely, the Southwest, the Southeast, and the Northwest Coast.

The Southwest has received many cultural impulses from Mexico, such as painted pottery, stone masonry, and cloth-weaving. Curiously enough, however, the Southwestern culture has been passive in that it never affected to any great extent the surrounding peoples.

The Southeast, it is believed, likewise received certain cultural traits from Mexico, as well as from South America by way of the West Indies. Such features as palisaded villages, urn burials, dugout canoes, cane splint basketry, the blow-gun, and incised pottery, point to a South American–Antillean origin. On the other hand, certain traits, such

as carved shell gorgets and the pyramidal mounds, were probably derived from Mexico. Certainly it is easy to discern an admixture of two great cultural currents which flowed into this area and which profoundly influenced the entire Southeastern culture. Moreover, the Southeastern culture was expansive and left its stamp in one form or another on a large part of the Northeast, the Great Lakes region, and the Plains area.

The Northwest Coast was manifestly different and isolated from the other centers. Few, if any, of the impulses which emanated northward from Mexico ever reached this region. Agriculture, pottery, and grooved axes were unknown. The art, basketry, weaving, woodworking, and especially the social and economic ideas were utterly different or represented special, independent developments. It is believed by students of the Northwest Coast culture that some of the culture of this region came from eastern Asia and was so completely reworked that it often is difficult to distinguish between that which was of independent invention and that of Asiatic origin. The influence of this culture center seeped southward, eastward, and northward.

III. INDIAN MOUNDS AND METHODS OF BURIAL

General

Who were the "mound-builders"? Why and how did they build mounds and where did they go afterwards? These are questions often heard.

The mounds which abound in the upper and lower Mississippi Valley excite the curiosity of many people, for a cloud of mystery seems to enshroud these prehistoric earthworks. As one looks at a mound, one can easily imagine the chatter of voices, the quarrels, the jokes, and the sweating that occurred as load after load of dirt was dumped on the intended spot.

Up to comparatively recent times, many people believed that the mounds were built by a highly civilized group of peoples who were finally overrun and stamped out by the uncivilized Indians. This idea of a mighty nation with advanced ideas of government and religion and with great knowledge of all the arts and crafts, which later disappeared leaving behind no evidences of its wealth, glory, and power save the mounds, is a fascinating theory, and one which, unfortunately, still has many adherents.

Careful archaeological work in the mound area has dissipated all former ideas of an extinct race of "mound-builders" and has shown, without any shadow of doubt, that the builders of the mounds were all American Indians, whose modern descendants were living somewhere in the Mississippi Valley when Europeans first penetrated the mound area.

Many of the mounds were built for burial purposes; others served as bases for houses and ceremonial structures; still others may have been constructed as village

enclosures or as fortifications; and a few were built for purposes as yet unknown.

The construction of the mounds presents no great engineering problem. Certainly there is no evidence that the Indians possessed any knowledge of machinery or any secret methods of construction. Building a mound involved willing laborers (there being no grounds for postulating slavery), cooperation, a preconceived plan, and hard, manual labor. One may gain some idea of the huge amount of work involved in building one of the larger Ohio mounds by considering the fact that it took the Ohio State Museum expedition of fifteen workers, equipped with teams and scrapers, about nine months to move the twenty thousand cubic yards in a burial mound which measured 250 feet long, 150 feet wide, and 30 feet high, and every advantage of gravity was seized upon to hasten the work. Imagine, then, how much more difficult it must have been for the original builders to transport such large quantities of dirt and to erect this great mound.

The method of building was very simple. Each person who was assisting carried dirt in baskets or skin bags and dumped his load on the ever-growing heap. Sticks, clam-shells, stone hoes or shoulder blades of bison, deer, or elk may have served to loosen or to dig the dirt.

The shapes of the mounds took several forms and may be classified as follows: round or conical, oval, pyramidal or flat-topped, linear, and effigy. Pyramidal or flat-topped mounds occur mostly in the middle and lower Mississippi Valley; effigy or "image" mounds are principally in Wisconsin.

A detailed consideration of the various types of mounds and their contents and of the type of burials may best be given according to culture areas.

MOUNDS OF THE GREAT LAKES AREA

In the Great Lakes culture area there are mounds of four general forms: conical with round bases, oval, linear, and effigy, plus a few anomalous, irregular types. Practically all these mounds were built for burial purposes. It should be noted, however, that these mounds were probably not all built at the same time. The mound-building urge may have lasted for several centuries or even longer.

Mound burials within this area were of four types:

(1) Flexed (buried in the flesh with knees drawn up toward the chest) (Fig. 1 *a*).

(2) Cremated (partial and total).

(3) Bundle (body exposed until soft tissues disappear and then bones interred) (Fig. 1 *b*).

(4) Extended (body buried at full length).

These burials may be in specially dug pits, on the floor or in the body of the mound.

Conical mounds (Fig. 2 *a*) range in diameter from 4 or 5 to 10 feet. Burials are found near the center, and are generally flexed and bundle, although extended and cremated types occur.

Oval mounds (Fig. 2 *b*) are not so common as conical ones, and may vary in size from 10 by 19 feet to 30 by 60, and in height from 1 to 3 feet. Interments are usually of the same type as those contained in conical mounds, and are in or near the center.

Linear mounds (Fig. 2 *c*) may be from 20 to 140 feet long, 11 to 25 feet wide, and 1 to 4 feet high. Burials, most often of the flexed and bundle types, are usually found anywhere along the major axis.

Effigy mounds (Fig. 3), occurring mainly in Wisconsin and most frequently representing bears, panthers, or birds,

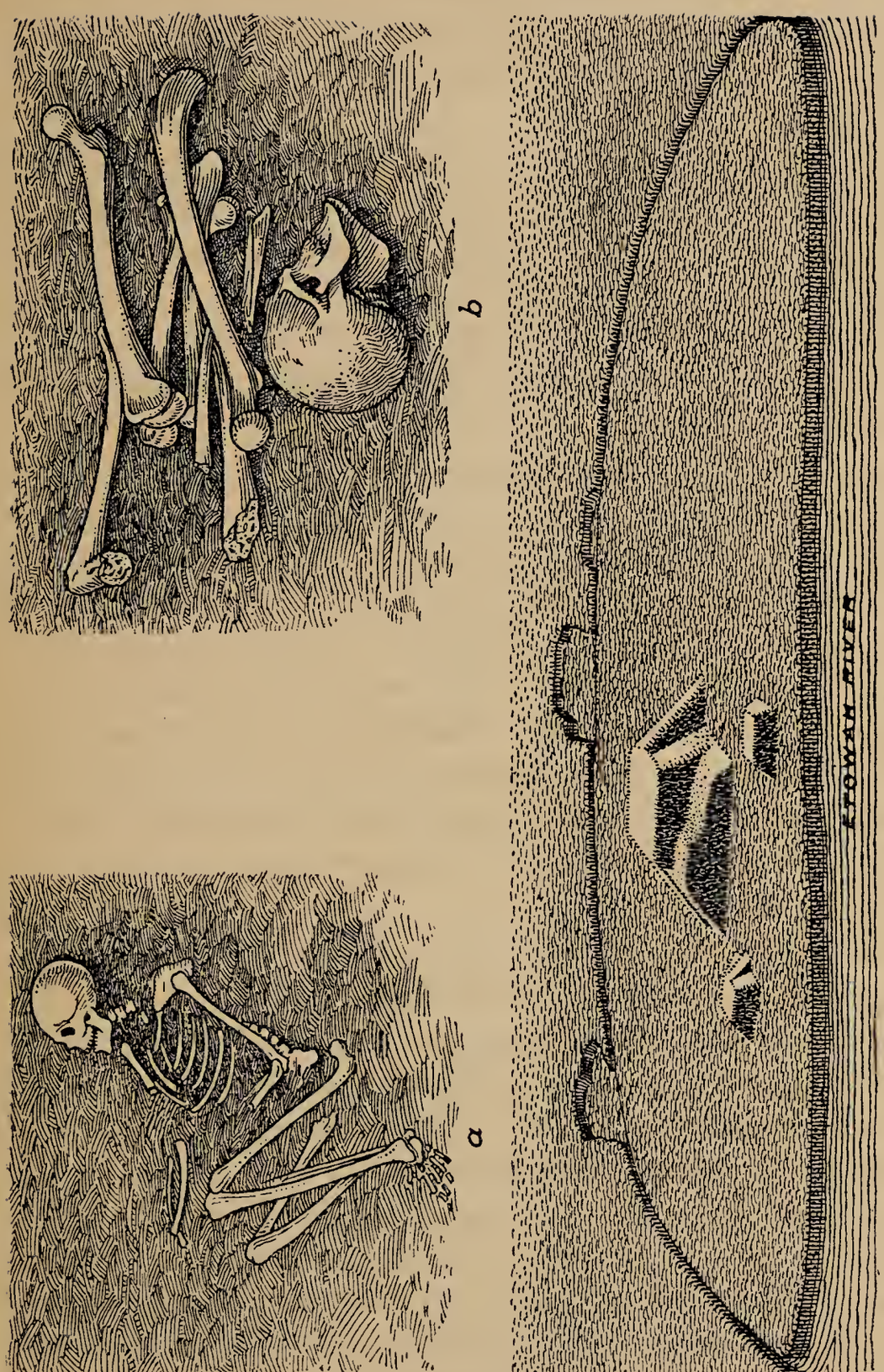

FIG. 1. *a*, Flexed burial; *b*, Bundle reburial; *c*, Etowah Mound group. After Moorehead.

may range in length from 30 to 575 feet, and in height from 1 to 3 feet. Burials occur in the heart position, in the head, hips, shoulders, and between the hips and shoulders.

It has frequently been claimed that effigy mounds were built to represent totemic or clan symbols, but there is no proof for this claim. Effigy mounds were undoubtedly constructed by Indians possessing an Algonkin type of culture. The various animal and bird forms may represent symbols or may merely be expressions of artistic impulses.

Any one who thoughtlessly excavates a mound in the hopes of obtaining some loot or of finding treasure will find that he has done back-breaking work for nothing; and, moreover, unless one has had special training, he may do much damage and destroy valuable information. All excavations should be done under the direction of a competent archaeologist. Artifacts of any kind are rare in mounds of the Great Lakes area, but one might find a few, such as potsherds, copper artifacts (rare), pottery tobacco-pipes, arrowheads, polishing stones, stone celts, and bone artifacts.

An exception to the mound culture of the Great Lakes region as described above should be noted. In western Wisconsin there is a group of conical and oval mounds recently excavated by an expedition from the Public Museum of Milwaukee. The Indians who were responsible for erecting these mounds must have been culturally related to those who developed and continued a high culture which centered in Ohio and which is known as Hopewell culture. Hopewell culture was especially noted for elaborate and well-executed copper ornaments, copper ear-rings, bear-tooth ornaments, silver artifacts, and peculiar copper celts. All these typically Hopewellian

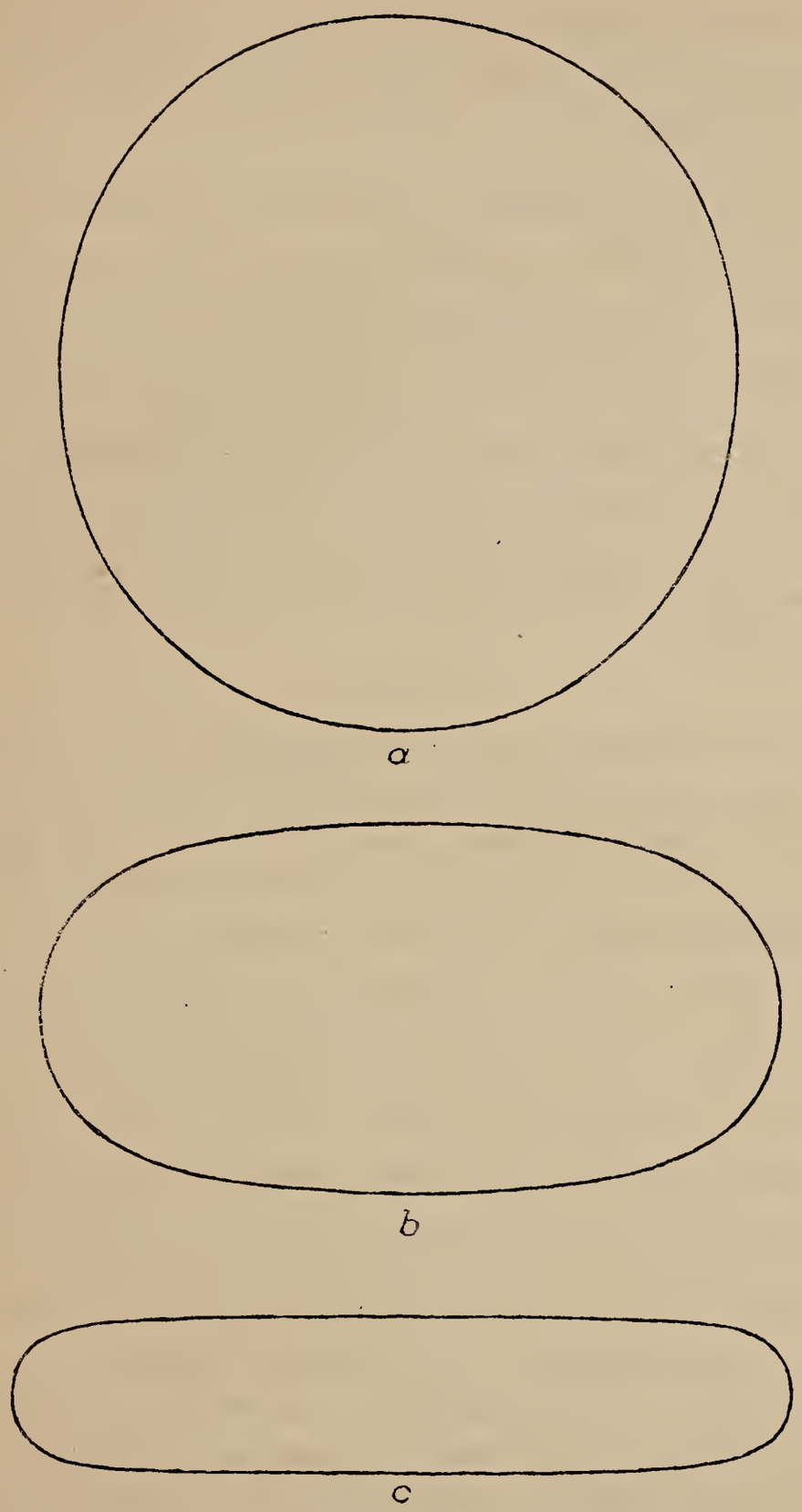

FIG. 2. Mound Shapes. *a*, Conical mound; *b*, Oval mound; *c*, Linear mound. After McKern.

artifacts were found in this group of Wisconsin mounds, which proves that they are an offshoot from the parent culture in Ohio.

MOUNDS OF THE MIDDLE AND LOWER MISSISSIPPI AREA

It is impossible in a short space to give any detailed description of the myriads of mounds within this area; first, because not enough archaeological investigations have been carried on; and second, because future work will probably make it clear that there are several culture sub-areas which may be linked with one another or with Mexico. Brief reference will be made here to the large or important mounds in Ohio, southern Illinois, Arkansas, and Georgia.

1. OHIO

At the present time archaeologists have identified three main types of culture within this sub-area: the Adena, the Fort Ancient, and the Hopewell, the last named of which was a highly advanced culture exhibiting a remarkable degree of esthetic attainment.

The Adena culture, located in the southwestern part of Ohio, is not sharply differentiated from the Hopewell, but possesses some distinctive traits as follows: large, well-formed, conical mounds, located near streams; uncremated burials, which were placed in log sepulchres either in the body of the mound proper, on the original surface, or under the base line; copper ornaments; tubular stone tobacco-pipes; mica ornaments; and arrowheads of the ovate unnotched and the stemmed types.

The Fort Ancient culture, as represented in the mounds, extends from the southwestern portion of Ohio over into the adjacent states of West Virginia and Kentucky. The mounds proper occur near village sites, are conical in form, vary in size from almost imperceptible

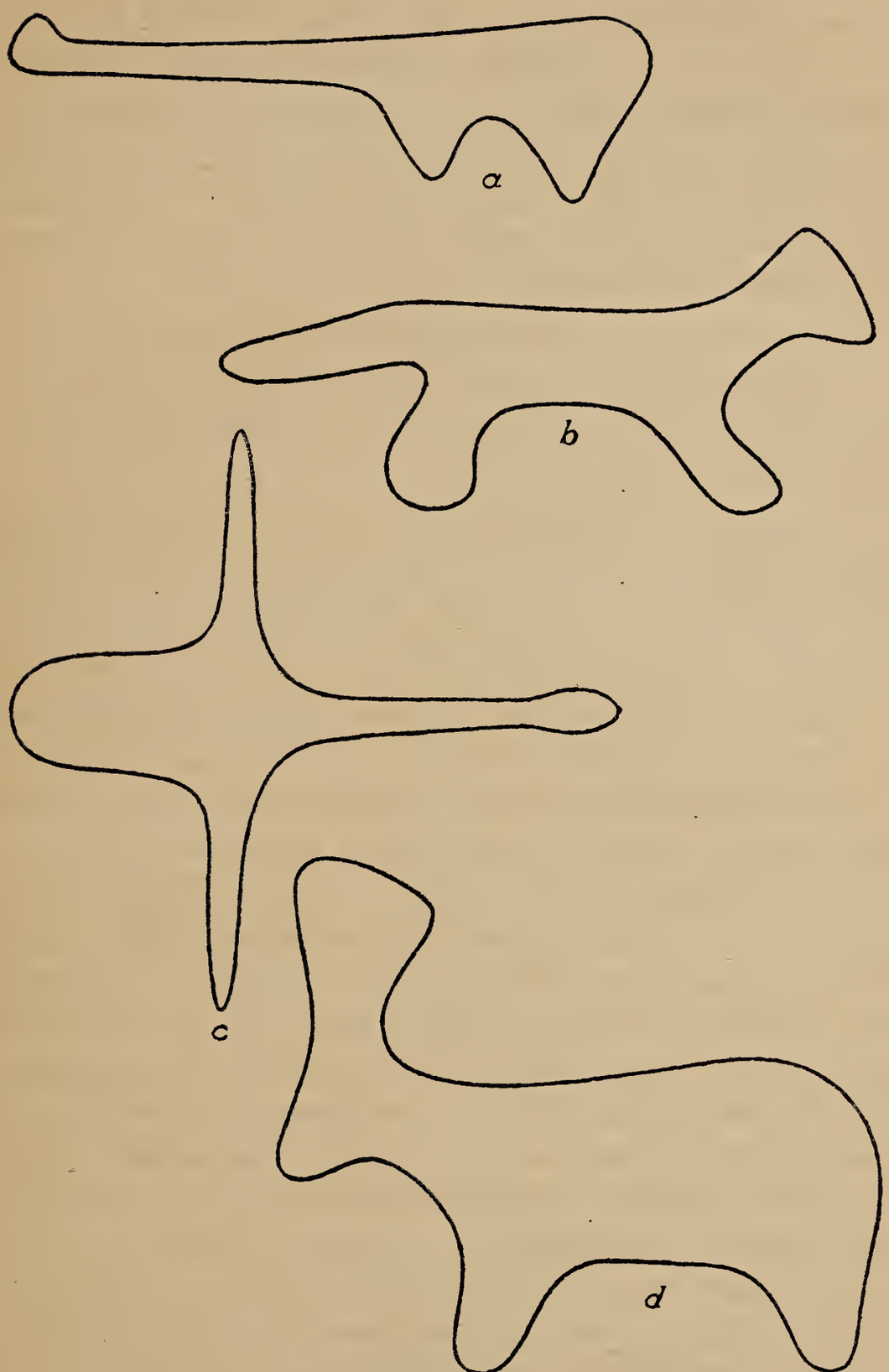

FIG. 3. Wisconsin Effigy Mounds. *a*, Panther; *b*, Canine; *c*, Flying water fowl; *d*, Deer. After McKern.

elevations to those of large size, and were used for burial purposes. Some of the most notable characteristics of this culture are permanent villages, free use of pottery, abundance of bone and antler tools, and chipped flint implements. Copper was used but rarely, as were also mica, obsidian, and sea shells. Grooved axes and problematical objects are lacking.

The Fort proper as well as the Great Serpent Mound has been attributed to the Fort Ancient culture, but at present it is not certain to what culture or cultures these great earthworks belong.

It has been suggested that the Fort Ancient culture was developed by tribes belonging either to the Siouan or Iroquoian linguistic families. More study of this matter will have to be undertaken before it can be cleared up.

The Hopewell culture, which also may have been developed by tribes belonging to the Siouan linguistic family, was probably more highly advanced in some ways than any other of the Great Lakes or Upper and Lower Mississippi Valley areas. The following partial list of traits may be considered as characteristic of the culture: no regular village sites; geometric earthworks with irregularly shaped mounds inside of or near them; carved stone, bone (Plate VIII), and shell ornaments; effigy tobacco-pipes (Plate I); well-woven, decorated textiles; pottery of an inferior quality; abundant use of copper for utilitarian objects and for ornaments, such as head-dresses, breastplates, ear-rings, bracelets, finger rings; designs cut out of sheet copper in life and geometric forms (Plate II); mica ornaments; and large obsidian blades or spearheads, the material for which may have come from Yellowstone Park, as this rock does not occur in Ohio.

The burial mounds, located either within the enclosures referred to above, or near-by, were constructed over sites where once stood ceremonial buildings. Burials in the flesh or incinerated remains were placed within the ceremonial structure, which, in some instances, was intentionally burned. After the structure had served its purpose, or after it was fired, a mound was erected over it or over the charred remains.

So-called crematory basins are often found on the mound floor. These crematory basins, consisting of small, shallow pits with borders of puddled clay, are probably too small to permit of cremation in the flesh, but might conceivably have served for burning bundle burials. Cremated bones are found but rarely in crematory basins.

The Hopewell culture or variants of it have been noted in Kentucky, New York, Indiana, Michigan, Illinois, Iowa, and Wisconsin.

2. THE CAHOKIA MOUND OF SOUTHERN ILLINOIS

Cahokia Mound, so-called because a tribe of that name formerly lived near-by, and located in Madison County, Illinois, just east of St. Louis, is the largest prehistoric earthwork mound in North America. It is situated in the alluvial plain of the Mississippi and stands near the center of an area which contains five groups of smaller mounds, all placed with a certain degree of order in respect to one another. The large mound and some of the smaller ones are now included in a state park.

The great Cahokia Mound covers an area of approximately sixteen acres. It may best be described as a truncated pyramid, rectangular in form, with a broad terrace or apron extending from the south side. The sides of the mound are all well oriented with regard to north-south, east-west points. The greatest height of the

mound is 100 feet; the east to west width is 710 feet; and the maximum north to south length, including that of the terrace, is 1,080 feet. The purpose of this enormous earthwork is not known, but it is believed that a ceremonial wooden structure may have occupied the spacious upper level. No thorough archaeological work has ever been attempted on or in this mound.

Excavations of near-by mounds, some of which are fairly large, yielded few skeletons, but brought forth some evidence for the conviction that many of these earthworks served as sites for buildings of some nature. The cemetery which should accompany such a large site has not yet been discovered. The pottery and artifacts found clearly indicate that this culture is related in many ways to that of the Lower Mississippi Valley.

3. MOUNDS OF THE LOWER MISSISSIPPI VALLEY

The mounds in this region, especially in Arkansas, Tennessee, Louisiana, and Mississippi, often attain great size, and are generally flat-topped or truncated rectangular structures or are conical in shape. The truncated type may range in length from 100 to 900 feet, in width from 80 to 400 feet, and in height from a few to 80 feet. The conical mounds may attain a diameter of 75 feet or more and a height of 15 feet, although the average elevation is about 5 feet.

In general it may be said that the high, truncated mounds served either as places of refuge from floods or as sites for houses and ceremonial structures or for both purposes. Burials are sometimes found in this type of mound.

The conical mounds generally yield more burials and artifacts, and were practically never used as domiciliary sites. Burials were likewise made in cemeteries adjacent

to the mounds. Five types of burials have been uncovered in this area: extended, cremated, bundle (singly and in groups), flexed, and urn.

Pottery occurs abundantly in the mounds and cemeteries, and is the most skillfully made and artistically decorated in North America, with the exception of that from the Southwest area. Pottery-making here really became an art. A great exuberance of forms is found and includes painted or incised bottle-shapes, "teapot" vessels, and effigy forms (especially human figures), as well as unpainted, incised cooking pots, water jars, and bowls, plain and painted. The colors used on the painted ware are red, white, and orange-buff (Plate III).

Found associated with burials are carved ornaments, beads and ear-plugs of shell, pottery tobacco-pipes, bone pins, plummets of hematite, and copper-covered stone ear-plugs.

4. THE ETOWAH MOUNDS

The great mound at Etowah (Fig. 1 *c*) is in the bend of the Etowah River near Cartersville, Bartow County, northwestern Georgia, and is next in size to the great Cahokia Mound in southern Illinois. It is a rectangular, flat-topped pyramid, about 60 feet in height, the diameters of the base being 330 and 380 feet respectively. A long, straight ramp which was built out on the eastern side of the mound and connected the surrounding plain with the summit, was the regular means of ascent. On this ramp was built a stairway with timber treads held in place by upright posts. On the south side is a low terrace, which was formerly taken to be a roadway, but which apparently was merely an incompleted addition to the large mound.

Surrounding this large mound, six smaller adjacent ones, and the village space is a deep moat or ditch, which developed gradually as tons of earth were removed for

the erection of the mounds. It seems quite likely that one end of this semi-circular ditch never connected with the Etowah River, although the other end may have.

The largest mound has never been well tested. The next smaller mound has recently been thoroughly excavated by Moorehead, who recovered a large quantity of valuable archaeological material including pottery; fragments of textiles and matting; shell and pearl beads; problematical chipped knife-like implements of flint, one of which is 26¼ inches long; a monolithic ax (blade and handle worked out from a single piece of stone); carved stone human figurines; carved shell gorgets; copper badges or symbols; and embossed copper plates.

The most recent evidence indicates that the builders of the Etowah mounds were probably members of the Muskhogean linguistic stock, which includes the following tribes: Creek, Choctaw, Chickasaw, Natchez, and Seminole. It would also appear likely that the Etowah culture is related to that found along the lower Mississippi River, and that it may have derived certain traits from Mexico.

It must be clear from the foregoing brief descriptions of the burials in the mounds that no conclusions as to culture affinities or as to the age of the mounds can be drawn from the types of burial; for apparently in different parts of the whole upper and lower Mississippi Valley and sometimes within a single mound, several burial forms are encountered.

No definite dates have as yet been assigned to the mounds, but it is probable that no great antiquity for them will ever be revealed. From all the evidence at hand it would seem that the oldest of the mounds were built not over two thousand years ago and that the mound-building complex, although waning, continued for some time after the arrival of the Europeans.

IV. MANUFACTURE OF STONE ARTIFACTS

Materials

The materials used by the North American Indians for manufacturing stone artifacts were varied, and were chosen with foresight and intelligence born of long experience, for the qualities best suited to the use to which the finished product would be put. For example, an ax intended for daily use would be made from some hard, tough stone such as granite, rather than from a soft material such as soapstone. Therefore, for the larger implements that would be given rough usage (axes, hammerstones, mauls, and so on) the following materials were chosen, depending, of course, on what local rocks were easily obtained: diorite, which is almost as hard as quartz; syenite; granite; quartz; and rocks of approximately the same hardness and compactness of texture. Sometimes axes, hammers, and celts are found to be manufactured from softer stones; in those instances, one must conclude that better materials were lacking or that they were made in haste to meet a particular emergency.

For smaller objects that required a cutting edge (arrowheads, spearheads, drills, and knives) quartz, flint, chert, quartzite ("sugar stone"), argillite, chalcedony, obsidian, jasper, and slate were employed. There is considerable confusion between the terms flint and chert, and most arrowheads are called flint, whereas they may be chert. Definitions vary greatly, but according to common usage flint is an opaque, indistinctly crystalline quartz dark gray or black in color; it generally breaks with sharp conchoidal fractures. Chert is an opaque, indistinctly crystalline quartz which is somewhat lighter in color than flint (see Glossary, p. 111).

Problematical objects were usually manufactured from slate, but quartz, sandstone, granite, diorite, mica schist, soapstone, and serpentine were likewise utilized.

Large quantities of partly worked stone were often carried from the quarries to the camps and then buried in caches to keep the stone fresh or "green," since it is claimed that fresh stone was more easily worked than that which had been exposed to the air. These caches served as reserve supplies and were drawn on from time to time.

PROCESSES

The processes of shaping stone into forms best suited to the needs of the Indians have been divided into four groups: (1) fracturing (breaking, flaking, and chipping); (2) crumbling (pecking or battering); (3) abrading (rubbing, scraping, polishing); and (4) perforating or drilling.

1. METHODS OF MANUFACTURE OF CHIPPED STONE IMPLEMENTS

There have been many misconceptions about the method of chipping stone implements (arrowheads, spearheads, drills, knives, scrapers, hoes, and so on; Plate IV). One of the commonest errors in regard to this subject finds expression in the idea that when an Indian wanted to chip an arrowhead, he heated the material to be worked and then dashed cold water on it! Needless to state, this treatment would result only in some fractured or shattered pieces of rock and would not produce even an incipient arrowhead. However, it is possible that large pieces of rock were broken into smaller ones by this fire and water method.

The first process named, that of fracturing, is the one that was most commonly employed in the manufacture

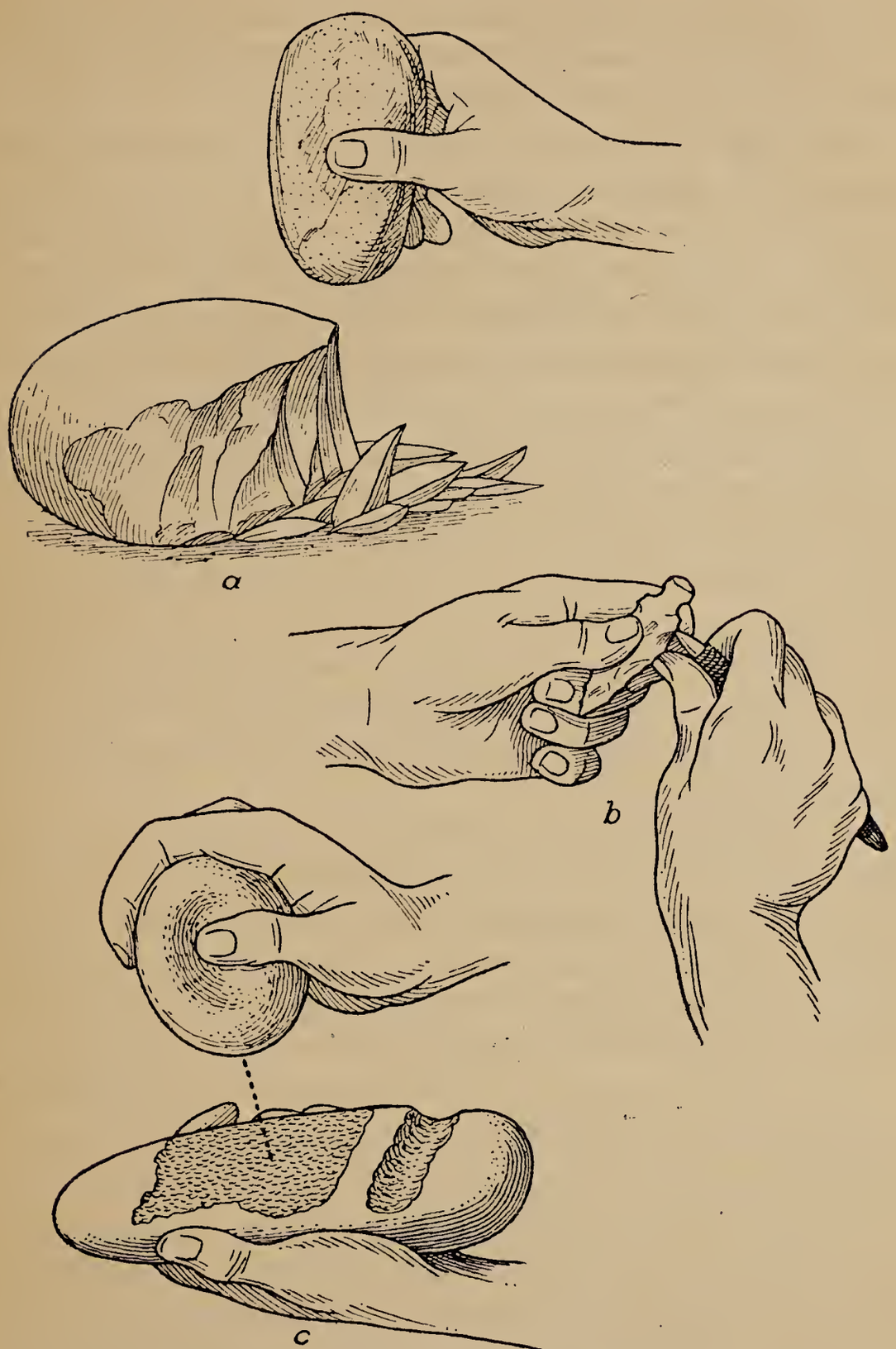

FIG. 4. Manufacture of Stone Artifacts. *a*, Producing flakes with hammerstone; *b*, Pressure chipping with bone point; *c*, Crumbling or pecking process. After Holmes.

of arrowheads and spearheads, knives, drills, and scrapers. There are many variations of this fracturing process, but only the common ones will be described.

The first step in the making of an arrowhead, for example, is the use of the percussion fracture process, by which small pieces or flakes are chipped from large stones. In knocking off such chips the hammerstone is most frequently employed. A hammerstone might be simply an unshaped river boulder, which for all intents and purposes would serve very well (Fig. 4 *a*).

After several chips of suitable size and thickness for arrowheads have been split off with a hammerstone, the next process consists in secondary flaking by means of pressure fracture or pressure chipping. It is not generally known that many kinds of stone can be shaped by means of pressure with a small tool of bone, horn, or ivory. Nevertheless, a small, unshaped, thin blank can be converted with ease and dispatch into a well-shaped, sharp-edged arrowhead.

This process of fracturing by pressure, which is particularly well adapted to the specialization and finishing of arrowheads and spearheads, knives, and scrapers, is that method which is used for chipping small, delicate flakes from thin-edged blanks by applying abrupt pressure with a bone or antler tool (Fig. 4 *b*).

One way of chipping by pressure may be described as follows: The blank to be chipped, resting on a bit of leather, is placed in the left hand and firmly held there by the finger tips. The point of the bone or antler chipping tool, guided by the right hand, is placed on the upper side of the blank very near the edge, and by an abrupt downward pressure a chip is removed from the under side of the blank. This process is continued until the arrowhead is shaped and provided with more or less

sharp, delicate edges. A well-made projectile point, knife, or scraper can be completely made from quartzite in about five minutes and from obsidian in from two to three minutes. A very long blade or agricultural implement might require as much as thirty minutes for completion.

Many projectile points that are to be seen in private and museum collections are beveled on one edge, generally the left. It is commonly supposed that the beveling was intended to impart a rotary motion to the arrow when in flight. Several tests were devised by the late Thomas Wilson of the United States National Museum to check this theory of rotary flight. More than a dozen bevel-edged arrowheads were selected and attached to smooth, straight, unfeathered arrow-shafts. Some of these arrows were dropped straight to the ground from the tower of the Smithsonian building, and others were launched in the air in every direction. He found that a rotary motion was universal. In another test, with the same specimens, he observed that a rotary motion was produced when the arrowheads, which had been arranged in a kind of wire holder which permitted longitudinal rotation, were presented, points foremost, to a current of air produced by a fan. Dr. Wilson concluded that, whatever the intentions of the arrow-maker were, the beveled edges did produce a rotary motion.

It should be noted that the feathering of an arrow keeps the rear end of the shaft in the line of progress of the arrowhead and produces rotation while in flight. If the feathering is too heavy, greater air friction is produced, and the loss of penetration due to the diminished velocity is very appreciable. The arrow-shaft need not be feathered if the foreshaft or head be heavy enough. However, the most important thing to note is that the rotation of an

arrow is not for increasing the violence of the wound, but merely to assist in delivering the greatest blow, which is only possible when the long axis of the arrow is in the line of direct motion. An arrow which weaves or wobbles is inefficient.

Most of the beveled projectile points are much too long and heavy to serve as arrowheads. It is far more likely that such implements were hafted and used as skinning knives, since the bevel on the left side would be pointed downward when the tool was grasped by the right hand. Such a tool would be most useful for loosening the hide of an animal. It might be well to note that the average chipped object may have been utilized as an arrowhead or spearhead, knife, scraper, or drill. It is sometimes practically impossible to distinguish one type from another.

2. MANUFACTURE OF AXES

Axes, celts, chisels, and other similar tools were generally made by what is called the crumbling process. This process may be defined as an operation in which a hard, tough hammerstone is used to peck, batter or crumble minute portions from the surface of a stone which is sufficiently tough and compact to resist fracture from an ordinary blow (Fig. 4 *c*). Naturally the crumbling process was often preceded by the percussion fracture process, and was followed by polishing, grinding, and sharpening.

The only difference between an ax and a celt is that the former is grooved for hafting, while the latter is ungrooved, shaped somewhat like a chisel, and often smaller than an ax.

It is the belief of many people that it required weeks and months to shape, peck, polish, and sharpen an ax.

Indeed, one writer states that it often took more than one lifetime to produce a stone implement of this variety.

Fortunately all the guesswork about this problem has been removed by the experiments carried out by the late J. D. McGuire in the United States National Museum. He used tools similar to those of the North American Indians, and all objects which he made were fashioned entirely with the tools that he produced from raw materials. He succeeded in pecking or crumbling stone with the stone hammer, carving, polishing, rubbing, and boring stone with the crudest of tools. He concluded that the time required for manufacture of stone implements was very short, especially if done by a skilled workman, which he was not.

McGuire made a grooved ax by primitive methods from a rough block of New Zealand nephrite, a very tough mineral having a hardness of six (see Glossary, p. 111). In the process of pecking or crumbling about one hundred and forty blows a minute were given. The hammerstones which he first used were quartzite pebbles found near Washington, D.C. Most of these pebbles lasted no more than ten minutes, and then were useless. Then he tried hammerstones made from gabbro and gneiss; but these, too, crumbled to pieces and were worthless. Finally, a piece of compact yellow jasper from the Yosemite Valley was produced, and about forty hours of work were performed with it.

After the specimen was roughly shaped, the pits were removed by grinding for about five hours on a block of disintegrated or rotten granite, which was kept wet. Then a polish was attained by rubbing the ax for six hours with a quartzite pebble, both dry and wet. Further polishing was attempted by rubbing with wood and buckskin, but without any effect. Thus, the manufacture

of this ax from a rock which was harder than those usually employed by the Indians and which in the beginning bore not even a rough semblance to the desired shape, required a total of sixty-six hours, including pecking, grooving, grinding, and polishing.

A second ax was made from a mineral called kersantite, which has a hardness of three or four. It took less than two hours to turn out a complete ax. The pecking in this instance was done with a quartzite hammerstone, and the polishing with a smooth quartzite pebble plus sand and water.

It seems obvious, then, that if an inexperienced person could turn out axes in a comparatively short time, an experienced person could produce a creditable, serviceable, grooved ax in from one to three hours.

But even after an ax has been fashioned, there is always some question as to whether or not one could really ever successfully cut anything with such a crude tool as a stone ax. Fortunately, again, to this question there is a direct answer furnished by practical tests on cutting pine wood with primitive tools. These experiments were done by G. V. Smith of Copenhagen, Denmark, and H. L. Skavlem of Lake Koshkonong, Wisconsin.

Smith, with a stone blade fastened to a wooden handle in primitive fashion, was able to accomplish the following:

(1) To cut in two in three-quarters of a minute a stick of fresh pine wood fixed perpendicularly to a work bench. This stick measured about 2¼ inches (0.0555 meter) in diameter.

(2) To cut in two in ten minutes, under the same conditions, a stick of pine measuring about 4¾ inches (0.1225 meter) in diameter.

(3) To cut in two in eight minutes a pine log measuring about 5 inches (0.13 meter) in diameter.

FIG. 5. Problematical Objects. *a*, *c*, Banner-stones; *b*, Bar-amulet; *d*, Boat-shaped stone; *e*, Discoidal; *f*, Bird stone. After Moorehead.

(4) To mortise and tenon two bark-covered logs.

He concluded that it would be much easier to fell standing trees than to chop them as he did at a work bench; that not too complicated carpentry can likewise be easily accomplished; and that a stone blade may be used for several cuttings without damaging the cutting edge to any noticeable extent.

Skavlem pecked, grooved, and polished an ax in four and one-half hours, made a crude handle in a short time, and cut down in ten minutes a water elm tree measuring three inches in diameter. The ax manufactured for this purpose was a more elaborate specimen than really was necessary, and probably cut no better than one which might have been made in two hours or less.

Thus it should be clear that an ax can be produced in a few hours and that as a cutting instrument it is serviceable and fairly efficient.

3. MANUFACTURE OF PROBLEMATICAL OBJECTS

The term "problematical objects" is used to designate all aboriginal implements the exact uses of which are not known. This category specifically includes polished stone objects often known as butterfly or banner-stones, bar-shaped stones, bird stones, boat-shaped stones, cones, cupstones, chunkey stones, discoidals, gorgets, plummets, pick-shaped stones, pulley stones, spools, spuds, tablets, tubes, and winged stones (Figs. 5, 6). Such stone objects, while fairly rare, are common enough to cause comment as to their origin, use, and beauty, and are found on the surface (sometimes in graves) from the Mississippi Valley east to the Atlantic seaboard, Florida excepted. It is not known exactly what tribe or tribes made these objects, except that they are the handiwork of the American Indians. Likewise their use or uses have never been

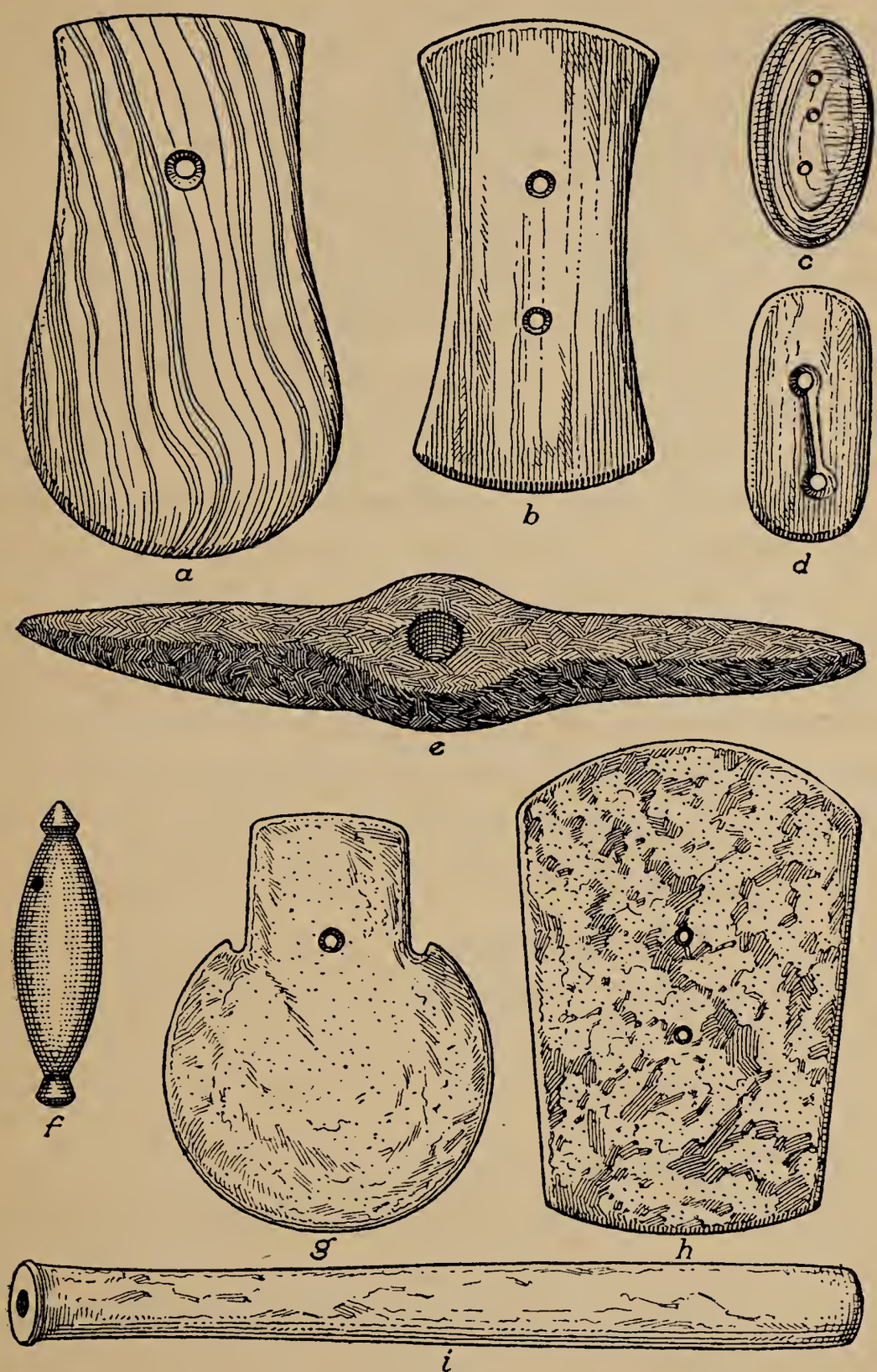

FIG. 6. Problematical Objects. *a–d*, Gorgets; *e*, Banner-stone; *f*, Plummet; *g*, Spatulate form; *h*, Tablet; *i*, Tubular pipe. After Moorehead.

exactly determined, although there are almost as many guesses and theories on this subject as there are different forms. A few of these speculations will be given, as they are both interesting and illuminating, and show what diversity of opinion there is.

The butterfly or banner-stones have claimed more attention than any other class, and therefore have been singled out for a variety of possible purposes or uses. A banner-stone (Fig. 5 *a*, *c*) may be described as a stone object with a single, cylindrical perforation through the short axis, and with two symmetrical, wing-like projections on either side of the perforation. These projections may resemble a double pick, a two-bladed ax, or two broad butterfly wings. One thing is certain, and this is that this type of implement, as well as most of the other problematical objects, probably never served any practical, everyday purpose, for it was usually made from a soft stone which would have broken if handled roughly.

It is claimed that banner-stones may have been used as:

(1) Mesh gauges employed in making fish nets.

(2) Medicine stones.

(3) Charms symbolic of the whale's tail and used in religious ceremonies.

(4) Hair ornaments, if mounted on bone or wooden pins.

(5) Weights for spear or javelin shafts.

(6) Spindle-whorls (a whorl is a flywheel for a spindle) used in fire-making and drilling.

(7) Pipe-rests, to prevent pipe tipping over when placed on the ground.

(8) Helmet ornaments.

(9) Money.

(10) Baton or scepter heads, mounted and carried as standards during ceremonies. This last surmise is based on the discovery in North Carolina of three banner-stones all mounted on engraved stone handles.

It will be seen that there are many opinions concerning the use or uses of such implements; but the fact remains that all opinions are guesses and as such are entitled to no more consideration than any guess would receive. It seems probable, judging from the kinds of materials used, the care lavished upon their manufacture, and the gentle usage to which most of them must have been subjected, that banner-stones were probably used either as ornaments, ceremonial appendages, or both.

The conceivable uses of the remaining types are many. The gorget (Fig. 6 *a–d*), generally a flat, polished, stone object of various shapes perforated in one or more places, is sometimes called a pierced tablet, bowstring gauge, badge, pendant, shuttle, twine-twister, bowstring guard, and bull-roarer. It is generally assumed that gorgets were purely ornamental and may have been worn around the neck or sewn to clothes. However, these uses are conjectural.

Bar-shaped stones, bird stones, and boat-shaped stones were likewise generally perforated in one or more places, and may have served a variety of purposes. It is probable that these were employed as ornaments or as ceremonial stones (Fig. 5 *b*, *d*, *f*).

Discoidals (Fig. 5 *e*), sometimes called chunkey stones, are circular disks of stone, ranging in size from one to eight inches in diameter and from one to six inches in thickness. The faces or sides may be flat, concave (hollow), or convex (bulging). A few of the discoidals having concave sides may have served as paint mortars, while others may have been used in a game called *chungke*,

chenco, or *chunkey* (the traders' name for this game). Chunkey was a man's game played with a stone disk and a long-forked pole. One of the players, who played in pairs, would roll the stone ahead; then both players would charge after the disk, and at the proper time would try to slide their poles after the disk in such a way that the disk would come to rest in the fork of one of the poles.

However, many discoidals would have been unfit for chunkey stones or mortars. It is often difficult to decide whether or not they should be classified as ornaments, sinkers, club-heads, digging-stick weights, hammers, polishers, pestles, or mullers; for in the course of their manufacture they may have been used for any one of these purposes.

Since these problematical objects are often so well made and since they illustrate several processes of shaping and working stone, especially the process of drilling, it might be well to examine into the methods of their manufacture. From a great many series found principally in prehistoric quarries and on camp sites it is possible to reconstruct the methods, as well as the successive stages, in the manufacture of problematical objects.

The first step in the manufacture of a problematical object, a banner-stone for example, was to quarry and shape with a hammerstone a rough, rectangular slab of stone, the length, breadth, and thickness of which corresponded approximately to the size of the finished product which the lapidary had in mind. The edges of this slab were first shaped with a hammerstone until the blank began to take on the appearance of a banner-stone. Then the sides were gradually pecked down to the desired thinness, and a centrum, through which the perforation was to go, was marked off and permitted to maintain its original thickness. Sometimes the holes were drilled

FIG. 7. Methods of Drilling. *a*, Hand drill; *b*, Pump drill; *c*, Strap drill; *d*, Bow drill. After Holmes.

through the centrum after the hole was merely indicated and the centrum shaped around it. After pecking had reduced the edges to the proper shape and the faces or sides to the correct thinness, the next process removed all traces of the pecking hammer by means of scraping with stone scrapers. Scraping was followed by polishing, which was probably accomplished with sandstone or wood and sand. Finally, if not already perforated, a hole was drilled through the centrum or short axis.

Boring might be accomplished in one of two ways. If a drill point of reed or tubular copper is employed, the entire drilling operation may be done from one side, and the resultant hole will be of uniform diameter throughout. If, however, a conical drill (drill with edges flaring outward) is used, be it copper, stone, shell, bone, or wood, it is easier to perforate a stone, especially if more than one inch thick, if the hole is bored from both sides (perforation made half from either side). This method prevents binding, and the resultant hole would be shaped like an hourglass.

The kind of apparatus used for motivating the drill point was probably the simple shaft or hand drill. This type of tool is merely a straight shaft of wood, about one-half an inch in diameter and varying in length from ten inches to two feet. It may be provided with a drill point of copper, stone, or bone. The shaft is revolved in alternate directions by rolling it between the palms of the hands. This mode of drilling seems to have been widespread in North America (Fig. 7 *a*).

Among the Eskimo and some northern Algonkin tribes two other modes obtained—the strap drill (Fig. 7 *c*) and its close relative, the bow drill (Fig. 7 *d*). The operation of the strap drill consists of twirling the drill in alternate directions by means of a strap or cord which is wound

once around the shaft and pulled first to the right and then to the left. The shaft is kept in position by means of a mouthpiece or with the aid of a helper. The bow drill operates in almost the same manner, except that the shaft may be steadied by the left hand, while the right saws a bow back and forth, thus causing the shaft to revolve in alternate directions. These two methods are vastly superior to the simple shaft drill, because the number of revolutions may be increased to such an extent and because greater pressure may be imparted to the shaft.

The pump drill (Fig. 7 *b*) is a mechanical device for drilling that is much more efficient than the other types described above. There is some doubt as to whether or not it was ever used in North America before European colonists arrived. A pump drill consists of a thin, wooden shaft about two feet long on which a disk (of wood, stone, pottery, or bone) is fastened near the lower end of the shaft and to the end of which is affixed a drill point. A bow or crosspiece, which is perforated in the center and to the ends of which are attached a bowstring tied to the upper end of the shaft, is lowered and raised on the shaft, which runs through the perforation of the bow. As this bow is quickly lowered, the shaft revolves, which unwinds the bowstring. The downward pressure is then relaxed; the impetus of the disk, which functions as a flywheel, is sufficient to wind the string up on the shaft in the reverse direction. Then the whole operation is repeated. After a bit of practice, the pump drill may be operated so quickly that the shaft hums as it revolves in alternate directions.

It is commonly assumed that the boring of the problematical objects must have consumed untold hours of

labor, especially if a hole had to be drilled through some of the harder materials, such as quartz or granite.

Happily, all doubts and guesses on this subject have been removed by the late J. D. McGuire who performed at the United States National Museum a series of experiments on the drilling and manufacture of problematical objects. A brief list of the results of his experiments, which are not only instructive but interesting, is as follows:

(1) In drilling catlinite, stone or metal points cut readily if the edges of the points were kept rough.

(2) Bone and wooden points tended rather to polish than to cut, although points made from ash wood cut fairly well if used with dry sand.

(3) A guide hole, pecked into the surface, was found necessary when drilling with tubular or hollow drills.

(4) Water was worse than useless in boring catlinite, for a cement formed when the catlinite dust and the water united.

(5) A typical stone drill point was not practicable in boring a hard stone, because unless held perfectly upright it would snap in two. It would serve, however, in drilling wood or as a gimlet.

(6) In using a metal drill point on most stones (catlinite excepted) water might be employed to prevent choking and clogging, and sand might be added to help increase the rate of progress.

(7) Water also helped float off the powdered material of most of the harder stones—an action which permitted the sand to be kept in contact with the surface to be cut.

(8) To keep the point supplied with sharp sand, a jumping motion was efficacious when a pump drill was employed.

(9) The rapidity with which a drill cut depended on the velocity. Pressure was likewise important, although too much pressure crushed the sand or broke the point of the drill.

(10) Boring a hole from opposite sides was easier.

(11) McGuire drilled a hole in marble three-eighths of an inch deep with pump drill and tubular copper point in fifteen minutes; another in a stone (of approximately the same hardness as quartz) one and one-half inches thick with a pump drill and a stone point in three hours; and a hole in catlinite (about as hard as slate) five inches deep with a pump drill and first a point of jasper and then of ash, in three hours.

(12) McGuire made a problematical object of the banner-stone type from steatite in five hours. This time included pecking, polishing, and drilling with a pump drill and a drill point of wood. This object measures about six inches across and two and one-quarter inches thick. He also manufactured another problematical object of the banner-stone class from siliceous sandstone (quartzite?) in three hours. This included shaping and drilling.

(13) McGuire concluded that the majority of problematical objects could be made in less than three days. Some of them could be completed in much less time, as he demonstrated.

Thus, the processes of shaping stone artifacts have been briefly described and illustrated. These may be summarized as follows: the percussion fracture process was chiefly employed for removing flakes or blanks from larger masses of rock; the pressure fracture process for chipping, flaking, and shaping blanks into arrowheads and spearheads, knives, scrapers, and drills; the crumbling process for shaping stone axes, mauls, corn-grinding

stones, wedges, chisels, celts, gouges, problematical objects, mortars, pestles, and so on, by pecking or crumbling with a hammerstone; the abrading process for grinding, whetting, scraping, and polishing axes, problematical objects, celts, gouges, wedges, and others; and the perforating or piercing process for drilling ceremonial objects, bone, shell, and stone beads, tobacco-pipes, and wooden objects.

V. MINING, MANUFACTURE, AND USES OF COPPER IMPLEMENTS AND ORNAMENTS

Mining

Copper ornaments and implements are frequently found in private and public collections of Indian artifacts. It has been a source of wonder and comment among collectors and other interested people to know where the copper for tools and ornaments came from and how it was obtained and worked.

When Europeans first explored and settled the St. Lawrence River and Great Lakes regions, they observed that copper implements were used, and they heard, upon inquiry, of great deposits of this metal which were to be found "to the west." It is evident from the earliest accounts of French and English explorers that the Indians were at that date (about 1650) still mining copper from the Lake Superior region although in limited quantities; for after the advent of the whites it was far easier for the Indians to obtain iron and brass implements and utensils and guns by trade than it was to mine and manufacture copper objects.

Native copper (that is, almost pure copper found in nature and often containing traces of silver and iron) occurs in small quantities in many places in North America, but the largest deposit and the one which probably furnished most of the copper used in prehistoric times is that located on the Keweenaw peninsula of northern Michigan and to some extent on Isle Royale. The Indians knew of this immense deposit as well as a smaller one near the Coppermine River, northwestern Canada, and both were worked to a considerable extent. As the Lake Superior or Michigan copper plays the more

important role in the aboriginal copper industry, it is the only one treated here.

When the term "mining" is used, it is with a special significance, for the Indian never mined in our sense of the word (that is, with tunnels, shafts, explosives, and powerful cutting tools). An aboriginal copper mine (Fig. 8 *a*) was nothing more or less than a shallow trench, which was dug into the side of a hill with the floor at the entrance or beginning of the cut low enough to provide natural drainage. These trenches were rarely if ever more than twenty-four feet deep and might be two hundred feet long. Sometimes, of course, the excavation was merely a pit, in which case it was not more than seven or eight feet deep. The mining of the Indians might best be described as prospecting.

Naturally, with only the crudest methods of mining at their disposal and with no knowledge of smelting or of stamping (a process which crushes copper-bearing rocks into tiny particles so that the grains of copper can be separated from the rock by washing), the Indians were interested only in pieces or veins of copper large enough to be easily detached from the matrix. Mass copper was frequently encountered. There is a record of one such mass weighing 5,720 pounds which had been detached from the rock by the Indians, but abandoned in the bottom of the pit, because there was no way of cutting such a huge piece into smaller ones. Before abandonment, however, all projecting pieces and irregularities were removed with stone hammers.

The mining operations were crude and primitive, but may be fairly accurately reconstructed from a thorough knowledge of what the ancient mines look like and what tools and other evidences of work remain. In all of the old workings were found marks of fire on the walls of

the pits, masses of wood ashes and charcoal, countless grooved and ungrooved stone mauls and hammers weighing from five to twenty-five pounds, a few copper implements, wooden bowls, and wooden paddles. The latter, which, if found near water, would have been unhesitatingly called canoe paddles, were probably used as shovels for moving back the rock refuse. The wooden bowls may have been used for bailing out the mine, but in all likelihood were used for quite another purpose.

From the evidence at hand, the method of mining was probably as follows: The process consisted of first heating the rock around the copper by building fires on the outcrops. The rock heated in this manner was then cracked and partially disintegrated by contraction produced by the sudden dashing on of water. Any bits of rock adhering to the copper were knocked off by stone mauls and hammerstones. This process would account for the quantities of ash and charcoal found within the ancient mines, the fire-marks on the walls, and the wooden bowls which undoubtedly were used when water was dashed on at the proper moment, when the rock had become sufficiently hot.

Not all the copper used in the central, eastern, and southern parts of North America was mined. Some of it, perhaps much of it, was picked up in the regions which had been covered at one time by glacial drift. These pieces of copper so found, ranging in size from small nuggets to large masses of fifteen hundred pounds or more, were torn by glacial action from the parent veins of the Lake Superior region, transported great distances, and deposited on the surface when the snow and ice melted. Such pieces, found at a distance from the Lake Superior source, are commonly called "float" or "drift" copper, and are still reported from Iowa, Minnesota, Illinois,

Indiana, Ohio, Michigan, Wisconsin, and Pennsylvania. Many copper implements and ornaments were doubtless manufactured from such pieces of float copper. Lake Superior unworked copper must have been traded great distances, for copper ornaments are found in Florida, and were probably made from copper found in the Lake Superior region, although there is a possibility that some native copper was obtained from the Appalachian Mountains or from Cuba.

MANUFACTURE OF COPPER TOOLS AND ORNAMENTS

There exists a very common but fallacious idea that the Indians possessed a secret process for so hardening or tempering copper that their knives, axes, chisels, and wedges were as hard and sharp as steel. Nothing could be farther from the truth. Such a belief is unfounded. No copper object of Indian handiwork has yet been found that has a greater hardness than can be imparted by cold hammering; there is no process yet known to metallurgists which will temper copper, nor did the Indians know of any such procedure. Many pieces of copper obtained from burial mounds or from aboriginal camp sites have been chemically analyzed, and no trace of any tempering agent was ever reported. In fact the analyses show that the percentages of pure copper in the specimens examined is from 99.650 to 99.913, plus traces of silver, iron, cobalt, arsenic, and nickel. These figures clearly indicate that the aboriginal inhabitants of North America knew nothing of smelting (that is, the process of recovering copper from copper ores by the aid of heat and the employment of fluxes and carbon), tempering, or hardening by alloying copper with other metals. Annealing and cold hammering were the two methods practised, both of which will be explained in this chapter.

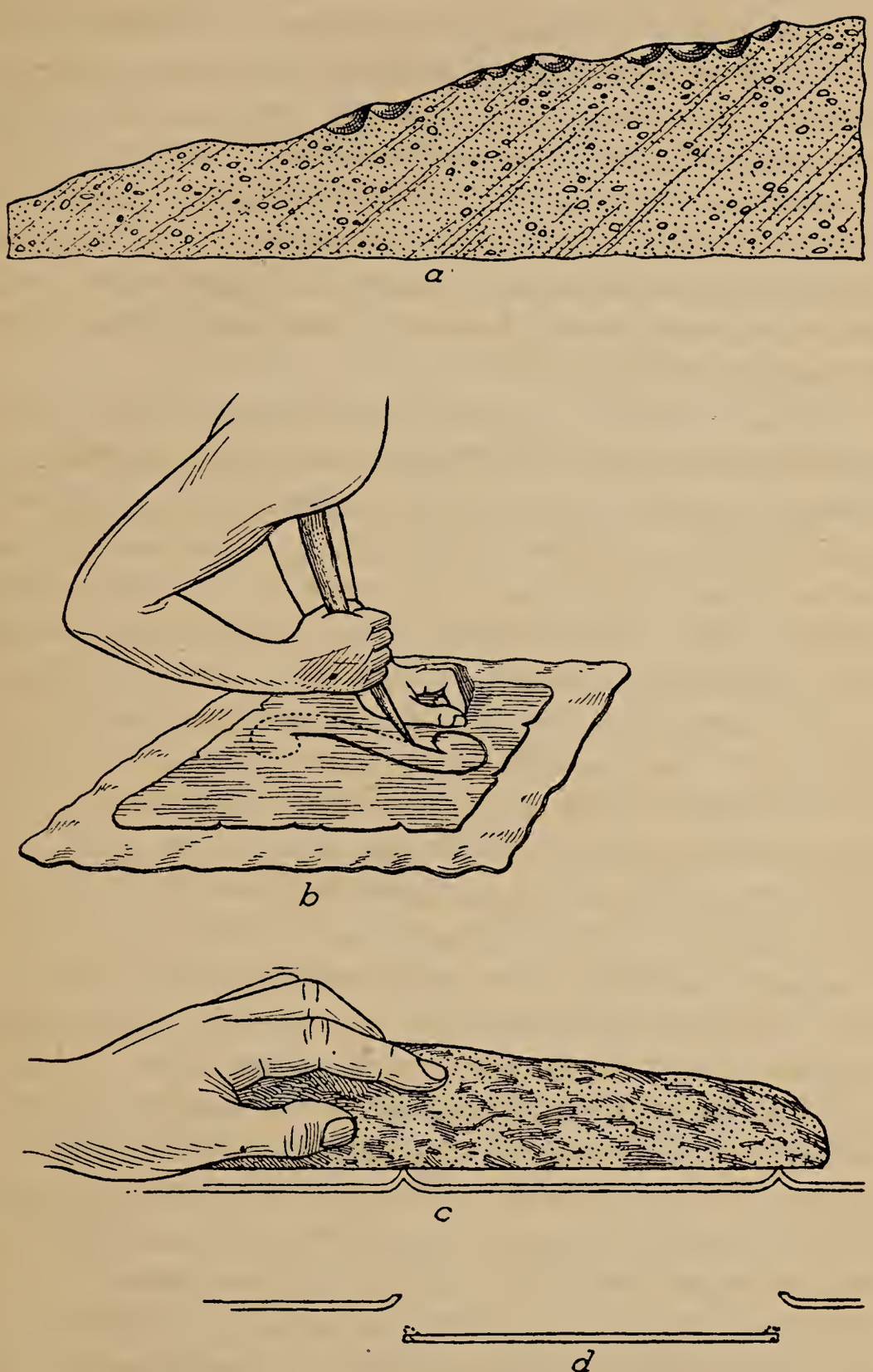

FIG. 8. *a*, Cross section showing pits made by Indians in mining copper; *b*, Method of graving copper plate with horn tool; *c*, *d*, Method of severing figures from copper plate by grinding. After Cushing.

If one were to plot a map of North America to show the distribution of types of copper objects, one would see that in the eastern and southern portions copper was principally utilized for ornaments (Plate II) and in the Wisconsin-Illinois-Michigan and adjacent areas, copper was employed almost exclusively for objects of a utilitarian nature such as celts, arrowheads and spearheads, picks, gouges, wedges, awls, fishhooks, harpoon-heads, knives, and drills (Plates V, VI).

These implements were all cold wrought; that is, they were hammered from cold nuggets with the aid of a stone hammer. Later they were sharpened and polished with rough grinding stones. Fortunately for these Indians, copper is very malleable and ductile, and therefore easily yields to such manipulation. Beating native copper adds to its hardness by compressing the regular network formed by the molecules of the crystals. Experiments at Peabody Museum of Harvard University were undertaken to ascertain whether copper tools could be manufactured with nothing but primitive tools and with no heating. The results proved that copper implements (except ornaments) could be reproduced without the aid of heat.

Many collectors attempt to distinguish between a very ancient copper tool and one of more recent origin by the amount of corrosion which is apparent. Such a criterion for estimating the age of a copper object is useless, for the amount of corrosion which collects on copper objects varies according to the method of manufacture, the soil conditions in which they are found, and perhaps other factors not yet fully understood.

Many of the copper ornaments recovered from the mounds of Ohio, Georgia, Florida, and elsewhere exhibit amazingly intricate, regular, and artistic designs as well as a surprising neatness of finish (Plate II). It was

believed that the Indians, lacking knowledge of casting and steel tools, could not have manufactured such beautiful copper ornaments merely with implements of stone and bone. Several experiments were therefore made in order to ascertain whether or not copper ornaments, such as were found in Indian mounds, could be manufactured from native or pure copper with tools of a primitive nature only, such as stone hammers, bone chisels, and an open fire. The results of these experimental efforts prove that such primitive methods as were used by the Indians were quite adequate enough to produce elaborate and well-executed copper ornaments. The results of two of these experiments will here be briefly described.

The late Frank Hamilton Cushing of the Bureau of Ethnology was an anthropologist who was intensely interested in primitive processes and methods of manufacture and who, from his intimate daily life with certain Indians, developed a remarkable skill in primitive practices. Cushing started his experimental studies in primitive copper working on the assumptions that the first workings in copper were influenced directly by other antecedent arts, such as work in stone, bark, skin, and horn; that annealing (the process whereby copper is made more elastic, tougher, and less brittle by heating it and then plunging it into cold water), an important factor in beating native copper into thin sheets, was undoubtedly suggested to the Indian coppersmiths by the fact that heat was resorted to in analogous processes; namely, in working hides and horn, as well as in straightening arrow-shafts, and in mining copper and in disintegrating portions of rock adhering to drift copper. At any rate, the process of annealing was probably generally known. Even the northern Athapascans, a people of low cultural status, were reported in 1771 as understanding this procedure.

In making a plate of sheet copper, the experimenter found that a soft metal like copper if hammered slantingly will spread and behaves in general as rawhide does. A rough stone maul of granite or quartzite aided in thinning and spreading the metal by displacing the surface molecules at many points. This mode of treatment pitted the face of the metal which was thereby toughened and was not so much in danger of scaling or cracking as it would be if a smooth-faced iron or steel hammer had been used.

When the metal was reduced to the desired thinness, all large irregularities were removed with a smoother stone, and the surface then ground and scoured with a flat piece of sandstone.

To reproduce the figure of an eagle in sheet copper such as was found in a mound, Cushing first softened his sheet of copper by annealing it. After lightly tracing the eagle pattern on one face of the metal plate, he placed the latter on a mat of buckskin which was laid on a level, hard piece of ground. The design was then etched or graved into the copper plate by means of a long, pointed tool of buckhorn butted against the chest of the worker, who applied sufficient pressure to make the graving tool sink into the soft metal (Fig. 8 *b*). This simple treatment produced sharp, smooth grooves, wherever the horn point had been applied. On reversing the plate, the design was clearly exhibited in raised outline or embossment. The tips of these outlines or ridges, which formed the eagle pattern, were then ground crosswise with a flat piece of sandstone, and after seventeen minutes were finally cut through (Fig. 8 *c*). The eagle form as outlined by the graving was thus entirely severed from the plate. The portion from which the design had been cut resembled the open spaces of a stencil.

Cushing concluded from his experiments that he had never heard of or seen a single object of copper which he could not reproduce from native or nodular copper with only primitive tools and methods.

C. C. Willoughby, director emeritus of the Peabody Museum, Harvard University, likewise performed an experiment in working native copper with primitive tools only. Two trials were made to form copper sheets from native copper, both of which were successful. The first sheet was hammered from a copper nugget recovered from the interior of an Indian mound of Ohio, and the second from a piece of native copper obtained from the Lake Superior region. Only one attempt was made to make an ornament from a sheet of copper thus produced, and the result was eminently satisfactory. Aside from the fact that the ornament which Mr. Willoughby formed is uncorroded and therefore shows no age, one could not tell the difference between his product and the original which he so carefully copied.

It was decided to reproduce an ear ornament because the process involved using all the steps necessary in making any object of copper; namely, hammering, annealing, grinding, cutting, embossing, perforating, and polishing.

A sea beach strewn with waterworn stones was the scene chosen for the experiment. The piece of native copper obtained from the Lake Superior region was placed upon a smooth stone which served as an anvil, and was beaten with a stone hammer. After a few blows the copper began to crack about the edges. This difficulty was overcome by annealing (heating and cooling suddenly). A thin sheet was finally produced by means of careful hammering and repeated annealing, and was ground down to a uniform thickness between two flat stones.

The sheet was cut into a circular form by cutting partly through the metal with sharp flints and breaking off the unnecessary pieces. The rough edges were filed down by means of grinding stones.

Willoughby assumed that the original ear ornaments which served as his copies were made over a mold, because the disks forming the ornament were practically alike in size and contour. Therefore, he made a mold of the proper shape from a piece of driftwood by charring, scraping, and cutting with sharp flints. The copper disk was then laid over this mold and gently forced into shape by light hammering and pressure from a pressing tool made from a splinter of bone found on the beach. During this molding process it was again necessary to resort several times to annealing. The perforations in the ornament were made with a rude flint used as both a drill and a reamer. A final polish was administered by means of fine sand and wood ashes. This practical demonstration convinced Willoughby that any copper object found in mounds or on camp sites could have been made by the primitive processes known to the Indians.

Some of the copper ornaments found in various parts of the eastern and southern United States are so well made that some investigators have wondered whether or not these copper objects were made in Europe and traded to the Indians after the discovery. Others, who did not doubt but that the ornaments were objects of Indian handiwork, believed that the copper plates from which the ornaments were made may have been produced in Europe and then traded to the Indians. There is little, if any, doubt but that both of these views are wrong. The whole matter was settled some years ago when Clarence B. Moore clarified and solved these problems by submitting a number of genuine Indian copper artifacts

to competent chemists for analyses. The results of Mr. Moore's study are as follows:

(1) Native copper is much purer than any copper recovered from ores by the smelting processes known in Europe in the sixteenth and seventeenth centuries.

(2) Copper which is only 99 per cent pure is considered a very poor article; so a difference of .3 or .4 per cent makes all the difference between a good and a bad grade of copper. For example, a piece of Indian sheet copper made from native copper contained 99.913 per cent copper; whereas a fragment of copper of European manufacture, which was traded to the Huron Indians, yielded only 98.97 per cent copper, thus showing the large difference of .943 per cent between native American copper and European smelted copper.

(3) European smelted copper always contains a large amount of impurities, such as lead, iron, nickel, arsenic, silver, antimony, and bismuth; whereas native copper from North America never shows a trace of lead, and but minute traces of silver, arsenic, nickel, and cobalt.

Moore concluded that all the copper ornaments and tools obtained from Indian mounds were made by the Indians from native copper, because, chemically, native copper is infinitely purer than that obtainable by European processes of smelting which were in use in the fifteenth and sixteenth centuries.

VI. BONE AND SHELL WORK

Bone Work

Bone and similar materials, such as horn, ivory, whalebone, turtle-shell, teeth, hoops, beaks, and claws, served such an infinite variety of uses and were so commonly employed all over North America for every conceivable sort of object both utilitarian and ornamental, that it is well-nigh impossible to include in this section a description of all bone objects. A short summary will suffice.

Bone tools and ornaments were easily and quickly manufactured with the aid of stone tools, such as knives, drills, scrapers, saws, and grinders. A list of the most common uses to which bone was put would include awls, needles, fishhooks, pins, arrow-points, harpoons, cutting and scraping tools, tool handles, and chipping implements. Flutes, whistles, and instruments for imitating animal calls were also made from bone. The shoulder blades of large animals, such as the elk, buffalo, and deer, were extensively employed throughout the areas where agriculture was practised as digging tools in planting work. Dippers, cups, and ceremonial head-dresses were frequently prepared from horn.

Because polished bone is so pleasing to look at, agreeable to feel, and easy to produce, it was used to an extraordinary extent in the manufacture of bone ornaments (Plate VIII), such as pendants, gorgets, hairpins, wristlets, necklaces, and bracelets. Teeth, claws, and small bones were likewise utilized as ornaments.

Dice, gaming sticks, and other game paraphernalia were fashioned from the teeth, the large bones, and the many small foot-bones and hand-bones of animals.

In northern North America, where wood is scarce or absent, bone as a workable and fairly plentiful material was seized upon by the tribes of that region as a substitute for wood. In this remarkable adaptation, bone became very important and was put to many and extraordinary uses. Whale ribs served as the framework for houses, caches, and shelters; as the ribs of boats; and as the runners for sleds. Bone, ivory, and antlers were invaluable for making clubs, boxes, picks, scrapers, knives, harpoons and harpoon shafts, spears, and bows and arrows. Furthermore, these same materials were utilized for the manufacture of tobacco-pipes, toys, dolls, amulets, beads, pendants, hairpins, and combs, and for weaving, netting, and sewing tools.

Although wood was plentiful on the Northwest Coast (British Columbia and Vancouver Island) and was used extensively by the tribes of that region, bone likewise was employed for many objects, such as cups, ladles, spoons, clubs, awls, ornaments, and charms. In southern California, especially on the Catalina Islands, where stone axes and celts were never manufactured or used, clubs and chisels were fashioned from whalebone. Needless to state, bones, claws, skulls, and teeth were often employed in making up "medicines" and in warding off disease, trouble, and danger.

SHELL WORK

Rocks and minerals were commonly used by all North American aborigines, and copper by many tribes; but considerable effort had to be expended to obtain these natural materials. Shell, on the other hand, abounds in regions near oceans, lakes, and streams, is easily obtained, lends itself to an almost endless variety of uses, and was eagerly sought in trade by groups of Indians living at a distance from the natural supplies. Therefore it is not

surprising that shell objects of one kind or another are more commonly recovered from ancient house sites and graves than any other articles.

The uses to which shell was put fall roughly into two groups—utilitarian and ornamental, and ceremonial. It would be impossible to describe here at length all ways in which shell was employed; merely a brief outline is given.

Unworked clam, scallop, and mussel shells served as cups, dippers, and vessels (Fig. 9 *h*). Large conchs were cut up and made into adzes, gouges, scrapers, and celts. The latter were employed, for the most part, for scraping and removing bark from tree trunks and for working wood. In the regions near the Atlantic seaboard large clam shells served as agricultural implements. Along the Pacific coast fishhooks made from abalone shells are frequently recovered from ancient graves and shell-heaps (Fig. 9 *f*, *g*).

Shell ornaments were more generally worn perhaps than any other kind, and are most frequently encountered in archaeological investigations (Fig. 9 *a*). Shell pins are often found in many places in the southern, eastern, and western portions of North America. This class of ornaments was manufactured by dint of much exertion and skill from the rod or central pillar of conch-shells. Although their use is unknown, they were probably highly valued and may have served as hair ornaments, awls, bottle stoppers, gaming pieces, or ear ornaments (Fig. 9 *b*–*e*).

By far the most common type of shell ornament was made of beads, which were fashioned from almost every kind of shell. Some beads were made from small, whole shells, pierced for suspension; others from small pieces cut from the most easily worked portions of abalone, clam, scallop, and mussel shells; still others from the rod or

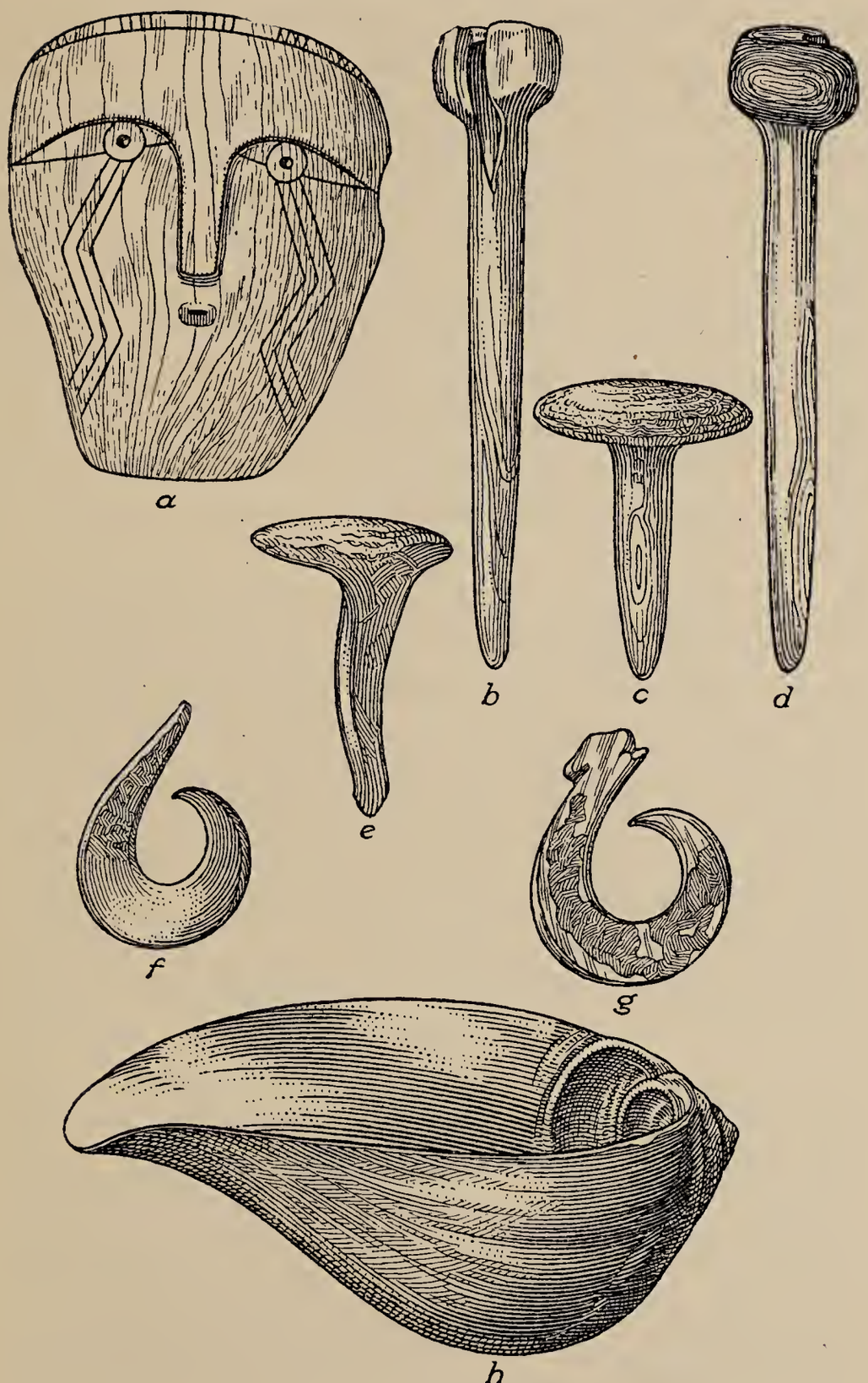

FIG. 9. Shell Work. *a*, Carved shell ornament; *b–e*, Shell pins; *f–g*, Shell fish-hooks; *h*, Shell vessel. After Holmes.

central axis of conch-shells. Shell beads may be divided into two types—discoidal or flat (Fig. 10 *b*) and tubular or cylindrical (Fig. 10 *c*). Their functions may be classed as necklaces, hair ornaments, neck-bands, ear-pendants, and bracelets; as ornaments for decorating baskets, bags, and clothes; as mnemonic devices (aids for memory or reminders) for recording and recollecting tribal history, law, and treaties; and as currency or wampum (Fig. 10 *d*).

An interesting account of the use of strings or belts of beads as memory devices of tribal councils is given by G. H. Loskiel, a missionary of the eighteenth century:

"Four or six strings joined in one breadth, and fastened to each other with fine thread, make a *belt of wampum*, being about three or four inches wide, and three feet long, containing, perhaps, four, eight, or twelve fathom of wampum, in proportion to its required length and breadth. This is determined by the importance of the subject which these belts are intended either to explain or confirm, or by the dignity of the persons to whom they are to be delivered. Everything of moment transacted at solemn councils, either between the Indians themselves or with Europeans, is ratified and made valid by strings and belts of wampum. Formerly, they used to give sanction to their treaties by delivering a wing of some large bird; and this custom still prevails among the more western nations, in transacting business with the Delawares. But the Delawares themselves, the Iroquois, and the nations in league with them, are now sufficiently provided with handsome and well-wrought strings and belts of wampum. Upon the delivery of a string, a long speech may be made and much said upon the subject under consideration, *but when a belt is given a few words are spoken;* but they must be words of great importance, frequently requiring an explanation. Whenever the speaker has pronounced

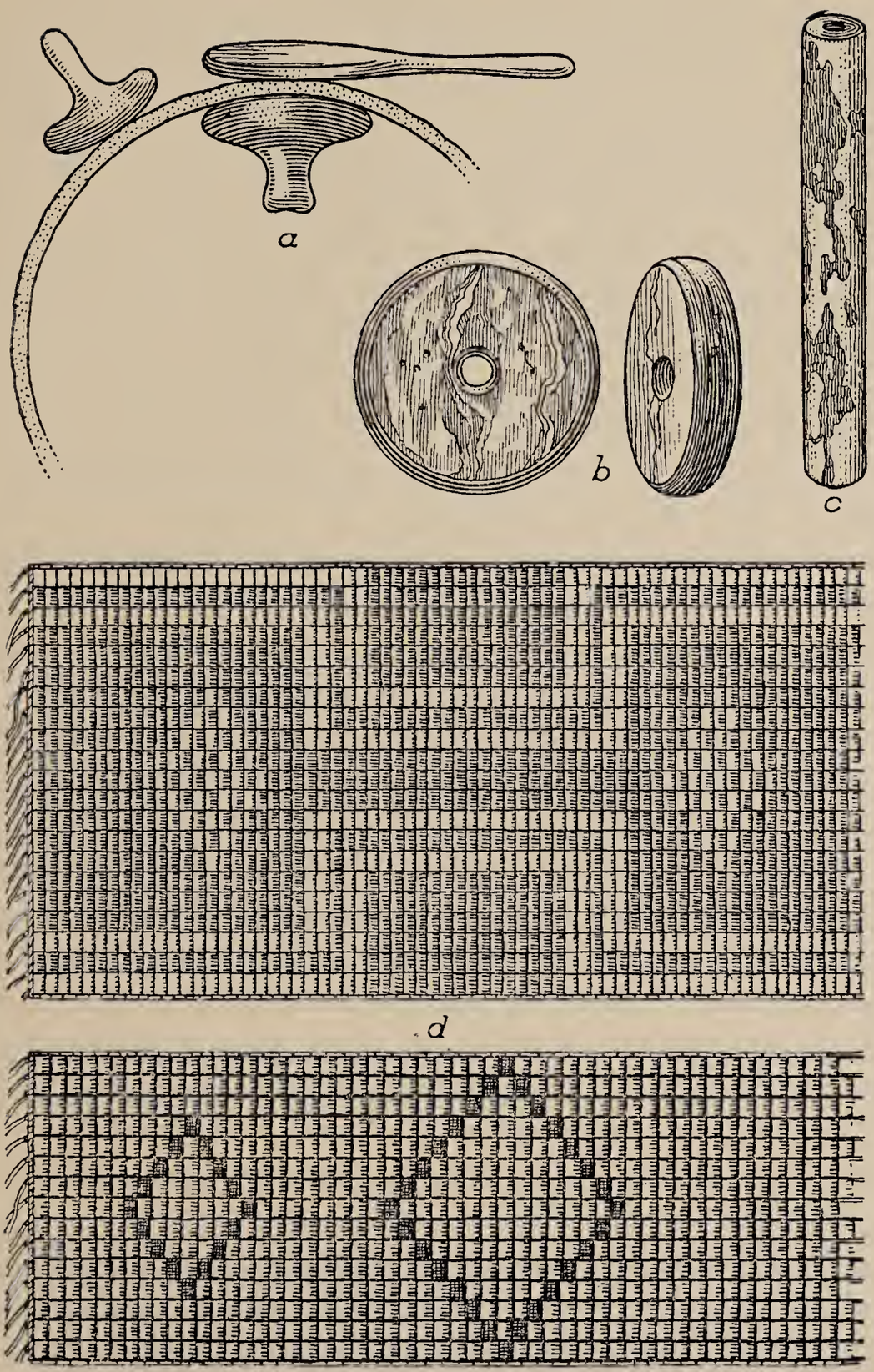

FIG. 10. *a*, Use of paddle and anvil in manufacture of pottery; *b*, Discoidal shell beads; *c*, Tubular shell beads. After Holmes. *d*, Parts of Iroquois wampum belts in Field Museum, Hall 4, Case 2.

some important sentence, he delivers a string of wampum, adding, 'I give this string of wampum as a confirmation of what I have spoken'; but the chief subject of his discourse he confirms with a belt. The answers given to a speech thus delivered must also be confirmed by strings and belts of wampum, of the same size and number as those received. Neither the color nor the other qualities of wampum are a matter of indifference, but have an immediate reference to those things which they are meant to confirm. The brown or deep violet, called black by the Indians, always means something of severe or doubtful import; but the white is the color of peace. Thus, if a string or belt of wampum is intended to confirm a warning against evil, or an earnest reproof, it is delivered in black. When a nation is called upon to go to war, or war declared against it, the belt is black, or marked with red, called by them, the color of blood, having in the middle the figure of a hatchet in white wampum. . . . They refer to them as public records, carefully preserving them in a chest made for that purpose. At certain seasons they meet to study their meaning and to renew the ideas of which they were an emblem or confirmation. On such occasions they sit down around the chest, take out one string or belt after the other, handing it about to every person present, and that they may all comprehend its meaning, repeat the words pronounced on its delivery in their whole convention. By these means they are enabled to remember the promises reciprocally made by the different parties; and it is their custom to admit even the young boys, who are related to the chiefs, to their assemblies; they become early acquainted with all the affairs of the state; thus the contents of their documents are transmitted to posterity, and cannot be easily forgotten."

Another and interesting use of belts of beads or wampum in the marriage proposal is given by Frank G. Speck:

"We are come on an important sacred errand, as it must be everywhere, because, whenever a young man commences to live, there surely comes time when he settles upon a woman to become his companion. So now one [young man] has settled upon your daughter. Now I can only say that our young man, Sable, is a good man. I never saw him in any wrong-doing. I can only say that he is a good man and can do everything. He is an expert hunter and canoe builder." (Then the delegate puts the wampum in the woman's [mother's] lap.) "When you are ready, answer us."

The mother remained quiet until the delegate was gone. Then she summoned the relatives, and the marriage proposal was considered. The discussion which followed was concerned with the characters of the girl and her suitor and with the important question as to whether or not the two young people were compatible and whether they would be happy. It was necessary that all the living relatives be present at the discussion, so that in the event a negative answer had to be rendered, the whole group would share the responsibility of offence in the eyes of the suitor's family. If a favorable answer were given, the following is an example of what would have been said:

"Wherefore we come to answer you. We all know that whenever any one selects his own companion for life, it must be done very carefully because, when two people marry, they must remain together as long as they live. Therefore it is necessary to be very careful so that the pair may be contented in mind and happy as well. . . . Now the relatives of our girl have gathered and not one

there has seen anything whatsoever wrong in the behavior of your young man. Now we give you a final answer. We accept your young man. The matter is now in your hands. Whenever you are ready, what you wish may take place."

One of the most interesting uses of shell beads or wampum was as currency or a medium of exchange. It is not precisely known whether or not the Indians employed shell beads as money before the advent of Europeans; but very early in the historic period shell beads were commonly used as a means of barter.

The oldest wampum seems to have been strings of flat or discoidal (button-like) beads, which because of technical limitations could not easily have been woven into belts. Strings of such wampum originally served, probably, merely as ornaments, and as such were highly valued and much prized. In historic times, cylindrical or tubular beads came into vogue, probably because with the aid of European steel tools it was easier to manufacture such a type, and probably because such beads could easily be woven into belts having patterns and designs produced by alternating the beads light and dark in color. Most people who are familiar with the term *wampum* think of it as signifying the tubular or cylindrical forms; but discoidal beads, whether they are the older type or not, should also be associated with it.

The discoidal beads were generally manufactured from the central rod or column of conch-shells by means of protracted efforts and much mechanical skill. The tubular beads were likewise generally fashioned from the same portion of conch-shells, but, if made in prehistoric times, the methods employed are not exactly known. There are some authorities who feel that such beads were too difficult for the Indians to make, since they had no steel tools;

but it would seem, at first blush, that if they had desired to manufacture them, it would have been quite within the range of their technical skill and development.

Wampum finally became so important as a currency that it might be worth while to state a few facts about it.

In the first place, it is probably inconceivable and certainly astonishing to people of the present time to learn that shell money was used in trade, not only among the Indians themselves, but also between them and the whites. One might wonder how shells could have any value as money, especially when it is realized that any one could procure the shells and turn out wampum beads. It must be clearly understood, however, that, although wampum was not like gold and was not backed by the promise of any government to pay in gold or other precious material, it was more sought after by the Indians than was gold, primarily because gold had no particular connotation of value to them and because wampum could be used as ornament and in many other ways. Moreover, shell money was generally acceptable, a condition which permitted its use as currency. There is also the fact that it took considerable time, effort, and skill to produce good and acceptable wampum, and thus in the wrought state the supply was at first limited. It is recorded that a trader wishing to buy skins or supplies from the Indians would probably be able to trade with them only if he used wampum money, as gold coin or bullion was not desired. Wampum therefore was legal tender in many places along the Atlantic seaboard, until the Dutch, thinking to profit thereby, imported machinery and proper tools and produced such quantities of it that the value sank and finally about 1700 wampum ceased to have value as currency.

The legal value of wampum fluctuated considerably from time to time. In 1637, in Connecticut, four wampum

beads were given a legal value of an English penny. In Massachusetts, in 1648, it was decreed that wampum, provided it was well made, should pass as legal tender to the amount of forty shillings. Eight white beads and four black were given the established value of an English penny. Later, the value fell and in 1662 it took twenty-four white beads or twelve black to equal an English penny.

In addition to its uses as ornaments, mnemonic devices, and currency, wampum belts likewise served as message-bearers, messages of condolence, announcements of death, fetishes, and pledges of honor.

Shell money was apparently used on the Pacific coast before the settlement of the whites. There were four kinds of shell used for currency; namely, dentalium (mollusk) or tusk-shells, clam-shell disks, olivella or snail shells, and abalone shells. In the early trade with Europeans, tusk-shell money had the following value: a string of eleven tusk-shells was worth $50.00; and a string of fifteen, $2.50. Clam-shell disk money was worth approximately $1.00 a yard. Olivella shell money was also valued at $1.00 a yard. Abalone shell was used for the most part as jewelry, but sometimes a single long piece of shell, cut, perforated, and polished, sold for $1.00.

VII. POTTERY

Distribution

Pottery-making was an art which flourished over the greater part of southern North America, with one or two notable exceptions. According to C. Wissler, if a line be drawn on a map of North America from Los Angeles to Edmonton, Canada, from there to Ottawa, Canada, and from Ottawa to the mouth of the St. Lawrence River, it will be found to form approximately the northern boundary of the pottery-making territory. It should be noted that within the area thus defined there is a strip running through the eastern parts of Montana, Wyoming, and Colorado, where pottery was rarely manufactured or used, although potsherds have been reported from eastern Colorado.

Outside of the pottery area of North America as defined above there are two localities where pottery-making was practised—that of the Yokut Indians of the San Joaquin Valley, California, and that of the Eskimo Indians of western Alaska. These two localities are removed from the large pottery-making area. These notable exceptions may perhaps be explained by the fact that the Yokuts may have received the pottery-making stimulus from the Indians of the southwestern area through the influence of certain Shoshonean neighbors (the Mono, Ute, and Paiute Indians), and the Eskimo from the eastern Siberian pottery-making tribes.

Thus it will be seen that the tribes of the greater part of the Pacific coast region, including California, Oregon, Washington, and British Columbia, as well as Canada, probably never made or used pottery; and that most, if not all, of the tribes south of the Los Angeles–Edmonton–

Ottawa–St. Lawrence boundary knew the art of making pottery.

MANUFACTURE

The methods of making pottery varied somewhat in different localities and will be briefly given. The first and most important thing to note is that in North America, so far as is known, the potter's wheel was never used for the manufacture of pottery.

There were five methods of making pottery, as follows: (1) the coil method (Plate VII); (2) the coil method used in conjunction with the paddle and anvil; (3) the paddle-and-anvil method (Fig. 10 *a*); (4) the method whereby pottery was molded in holes in the ground; (5) the method whereby pottery was molded over forms or in baskets.

The first method mentioned, the coil method, was practised among many tribes of North America, especially the west Alaska Eskimo, the Mono, the Hopi and Rio Grande Pueblo Indians, the Navaho, the Caddo, some Louisiana tribes, the Catawba, the Cherokee, and probably the New England Algonkin tribes, as well as the Iroquois. The coil method of making pottery, as its name implies, makes use of long strips or coils of clay which are employed as follows: The potter first forms the base of the future pot either by pressing it out of a lump or pat of properly tempered paste or clay, or by using the end of a roll of clay which is coiled on itself and worked into the proper shape; the base thus formed is then generally placed in a shallow basket or pottery dish in which the growing vessel rests. Then the potter builds up the walls of the pot by the addition of strips or rolls or ropes of clay, which are often long enough so that they will extend around the top more than once, thus producing a spiral effect; or which are laid successively one upon the other. The obliteration of these coils and of finger-prints is

generally done with a piece of gourd, a shell, or a smooth stone. To make the whole mass complete, to weld together the coils, and to eliminate any air-bubbles which may have formed, the potter pinches the rolls at every possible point.

The second method named above, the coil method used in conjunction with a paddle and an anvil, is essentially the same as the first, except that the coils are rarely applied spirally but merely for one circuit of the edge, and that a paddle and an anvil are employed to thin, compress, and weld the coils. The paddle is of wood and usually consists of a short handle and a blade about four or five inches square. The anvil may be merely a smooth stone or a mushroom-shaped, convex-faced piece of baked clay usually provided with a short stem or handle. When used, the face of the anvil is pressed against the inside of the vessel's walls to resist the blows administered with the paddle on the outside of the pot. It is reported that pottery made by this method was found among the Cocopa, Mohave, Cahuilla, Luiseno, Pima, Papago, Diegueno, Havasupai, and Ute; and was made by the prehistoric peoples of the Middle and Lower Gila River district of Arizona.

The third method, the paddle-and-anvil, is essentially different from the first two methods in that no coils or sausage-like ropes of clay are used. This method as practised among the Arikara Indians of North Dakota is best described by M. R. Gilmore as follows:

"The potter took a quantity of the clay, sufficient for a pot of the size she had in mind. She placed a flat bowlder for use as a working table on a hide spread on the ground, the hide being for the purpose of catching any of the loose crushed stone that might fall from the stone working table, so that it might be gathered again

for use. She took the lump of clay on the stone table, thoroughly kneaded it with her hands, and mixed with it what she judged to be a proper amount of the crushed stone for tempering. Now she shaped the tempered clay, working it out from the bottom upward to the top. When she had approximated the shape of the pot, she took in her left hand a smooth, round cobblestone, which she inserted in the pot. In her right hand she took a wooden tool like a flat club, eight or nine inches long, with which she beat the clay against the shaping stone held in the other hand. When she had drawn up the clay to the proper shape and sufficiently thin, she applied the desired pattern of decoration by incision with a small pointed and edged wooden tool, or by pinching and crimping the edge of the pot with thumb and finger."

Beating pottery from masses of clay by this method was also practised by the Mandan, Hidatsa, and Yankton Dakota Indians of the Plains area. Pottery anvils have been reported from Missouri, Tennessee, Kentucky, Alabama, and Wisconsin, but whether this fact necessarily implies that pottery was beaten from lumps of clay or not is a moot question. Some authorities believe that in the general area about the Great Lakes, pottery was made exclusively by the paddle-and-anvil method, but this problem is still undecided.

The fourth method of making pottery, that of using a hole in the ground, is reported from the Winnebago. The Winnebago are said to have made pottery by molding it with their hands or by plastering clay on the sides of holes of the desired shape dug in the ground and lined with leaves. This method is highly improbable, and the account of it may merely be the product of the Indians' imagination.

Cushing performed many experiments in making pottery by a method similar to the one just given. However, he found it necessary to sink a piece of netting in the hole so that the pot could be lifted out afterwards. When Cushing used the term "pot-shaped pit," he meant a pit the bottom of which was smaller than the top or mouth. He writes as follows:

"On returning home, I gathered clay and a quantity of sand. With the latter I made a pot-shaped pit like those I had discovered the faint remains of, rubbing thick clay-water around its perimeter to make the bottom and sides firmer, and keep the vertical portions from caving in. I allowed this form to dry. In the course of only two or three hours it had become comparatively hard. I then mixed clay-paste with which to form, inside of the pit, the walls of a vessel. Whilst the bottom and the lowermost portions of the sides of an incipient vessel could thus be formed with great ease, I soon found that it was nearly impossible to cause the thin wall of clay to adhere and thus retain its position higher up. It then first occurred to me that strips of bark, or fiber, or netting might be pressed into the pit and used not only to hold the clay in place around its sides whilst being built up, but also to aid in lifting the green vessel out when fashioned for drying. I therefore roughly netted together some coarse cordage in the form of a bag of suitable size and introduced this into the pit. The first experiment made proved a failure. When I had built up the clay nearly to the margin of the form, its sides collapsed inward, netted cordage and all. Again I proceeded as before, this time, however, weighting the edge-strings of the bag down to the surrounding surface with rocks. I succeeded perfectly in fashioning the vessel; but on endeavoring to draw it out found, of course, that it would be necessary to lift

evenly on all the edge-strings, else the still soft vessel would give way or at best be utterly distorted when taken out of its mold, by the unequal strain of the strings. It very quickly occurred to me that these difficulties could be overcome by attaching the strings to a hoop, then lifting the vessel out by means of that. Following this plan, I succeeded completely. The vessel left its bed easily, retaining its shape at the bottom and sides perfectly, but both the net and the hoop happened to be too small, hence the rim was puckered in by the tautness and indrawing of the strings near the edge and was thereby considerably contracted.... I managed, however, by scraping the inside of this rim with clam shells, to at once thin it and restore its roundness without causing it again to enlarge.... After smoothing the outside of the vessel here and there where its weight had caused the cords (especially at the bottom) to cut into it and form protruding lumps or bulges between the meshes, I suspended it to a couple of poles, supported horizontally, and left it to swing and dry in the wind and sun. Thus exposed, it set within an hour or two, becoming so firm that I successfully removed, by a sort of gradual peeling-off process, as one takes off a tight glove, the netted bag in which it had been suspended. After it had been slightly dressed down and welded where necessary by more scraping inside and out, with clam shells, I was surprised and delighted to find that its general surface presented almost the exact appearance of the outer surfaces of the sherds I had been finding, save that the textile impressions were coarser in my specimens than in the ancient ones."

There is some doubt as to whether this method was actually ever used, but it must be considered as a possibility.

The fifth method whereby wooden forms or woven baskets were utilized for making pottery is reported from several tribes, but the exact distribution of such a method or the extent to which it was employed is, like the preceding one, unknown at present.

The Osage of Missouri are reported as gathering clay, beating it to a fine powder, mixing it with water and finally spreading this paste over blocks of wood of various shapes. When the paste dried, the pots were removed from the molds and fired to be rendered hard. They likewise coated the inner surface of rush or willow baskets with a proper thickness of clay. When dried, the clay-lined basket was fired, a process which destroyed the basket-form, but baked the pot.

The Pawnee are said to have made pottery in a similar way, except that they were accustomed to smooth off the end of a tree for a mold.

Baking or firing was resorted to by all North American pottery-makers with the exception of the early Basket-makers of the Southwest. This is a process necessary for hardening the vessels so that they may be more easily handled and may be used for holding or carrying water. It is obvious that without such treatment the clay would quickly disintegrate. The process of firing generally took place after the pottery had been dried in the air for several hours, and the method used varied from place to place. In general, however, it consisted of surrounding the vessels as evenly as possible with burning fuel (bark, dried wood, or dried dung). Very often a preliminary fire was built, and, when it had died down, the vessels to be baked were inverted directly upon the hot coals and ashes or on some sort of grate, which formerly probably consisted of stones, but now may be constructed from iron rods or worn-out stone grates. The hot coals

and ashes were pushed up around the pots, and then the entire mass covered with fuel. After a proper time elapsed (thirty to sixty minutes), the vessels were pulled out, deposited near the oven and thus allowed to cool slowly.

DECORATION

Painted pottery had its highest North American development in the Southwest (Utah, southern Colorado, New Mexico, and Arizona), where red, buff, chocolate, black, white, orange, and yellow pigments were used separately or in striking combinations of two or three colors such as red, black, and white, or red and buff. Outside this area, however, painted pottery is somewhat limited in its distribution, being confined for the most part to the middle and lower Mississippi Valley regions, the Gulf coast, and Florida. A few pieces have been reported from Ohio, southern Illinois, the Aztalan site in Wisconsin, and eastern Tennessee and Kentucky. There seems little doubt that the impulse for decorating pottery with color came from the Southwest area. It is not without some significance that the greatest diversity in painted decoration in eastern North America was developed among the potters of the Arkansas region, a locality that borders rather closely on the Southwest.

The colors used in the Arkansas and adjacent regions were generally red, white, and brown. Judging by the pigments used in the Southwest, it is probable that red was produced by using a clay mixed with yellow ochre, which turns red on firing; white, by employing only a white clay free from iron oxides; and brown, by using the proper quantity of red iron oxide, which turns brown on firing. These colors were applied with brushes made from plant stems or possibly from bird feathers.

In the northern part of the pottery area, where painted vessels are rare or entirely lacking, pottery was either perfectly plain, smooth, and unpainted, or was ornamented merely with incised designs on a plain and unpainted background.

The term *incised designs* is a broad one which covers several types of cut-in or intaglio ornamentation, which are as follows:

(1) Incised design—executed presumably with a sharp-pointed implement.

(2) Trail design—a broad, shallow mark done presumably with a blunt or round-pointed tool.

(3) "Roulette" design—horizontal, vertical, or diagonal repetition of a simple design.

(4) Stamped design—applied probably with a carved wooden paddle or with a pottery stamp.

(5) Cord-marked design—impressed with a cord-covered paddle or, as Cushing suggested, by cord nets in which the vessel was built, or by netting wrapped around the hand.

(6) Fabric-marked design—applied with a fabric-covered paddle or otherwise impressed on the clay while it is soft.

(7) Punctate or embossed design—punctate when punched in with a pointed tool; embossed when raised or pushed up from the surface of the vessel. Very often a punched-in design will be punctate on one surface and embossed on the reverse, because the punching-in may produce a knob or stud.

(8) Thumb-marked or finger-nail design.

Naturally there are other ways of ornamenting a vessel without having recourse to pigments, such as

indented or crimped rims and designs in relief. In the lower and middle Mississippi Valley regions there occur many vessels modeled to represent animal, human, and grotesque forms. Likewise, in many parts of the Mississippi Valley, Gulf coast, and Florida regions are found handles or rim decorations modeled to resemble animal or human forms. Some pottery from the southern and southwestern areas of North America may bear both color and incised or relieved decorations on one vessel. The application of color and of incised and relieved designs was generally done before the vessel was fired, although the incised decorations on some pottery look as if they might have been engraved after the firing took place.

POTTERY TYPES

Since the Southwest culture area is not included in this handbook, a description of its pottery is omitted here.

There is one broad distinction which applies to most of the pottery of eastern, northern, and southwestern North America; namely, that most of it bears some sort of incised (intaglio) or relieved designs; whereas the pottery of the Southwest is rarely ornamented in this fashion.

It is impossible to give briefly all the ear-marks which characterize, distinguish, and set off one from another the potteries of the various regions of eastern North America; therefore, but a few of these peculiarities will be given.

In a very broad and general way it is possible to divide the pottery of the territory east of the Mississippi Valley into two classes—that of the southern part and that of the northern part of North America. Naturally, it is not possible to draw a line from east to west, south of

which one will invariably find elaborate pottery, and north of which one will always find simple pottery, because there exists a transitional zone where are found wares from both regions at one site. However, to gain a panoramic view of this subject, it is safe to state that the term "southern North America" means all that region east of the Mississippi Valley and south of southern Nebraska; northern Missouri, central Illinois, Indiana, Ohio, central West Virginia, and Virginia.

The pottery of the southern area varies somewhat from place to place, but one or more of the following characteristics occur: painted surfaces and decorations; varied shapes such as high, narrow-necked bottles, deep bowls, and plates; modeled pottery representing human, animal, and grotesque forms; flat bottoms as opposed to pointed; legs; incised ornaments consisting of frets, scrolls, and curves; and engraved symbolic or realistic designs (Plate III).

The pottery of the northern area differs materially from that of the southern. The following list presents a few of the most important and general characteristics of the wares of the northern area: no painted surfaces or designs; simple, straight-line, or fabric ornamentations; mostly conical or pointed bottoms; no animal, human, or grotesque shapes; no legs; and vessels nearly all wide-mouthed and globular.

It has been customary heretofore to divide the pottery of the northern area into two groups: the Algonkin and the Iroquoian. Whether or not this broad classification is a helpful one is a question open to debate. It is quite likely that this arrangement is too extensive to be of much practical use to students of ceramics and that it will be found necessary to make further divisions. For example, it has been possible to place Wisconsin pottery

in four different groups—Algonkin or Lake Michigan ware, Siouan or Upper Mississippi ware, Aztalan ware (a variant of Cahokia pottery), and Hopewell ware. However, a tabular list of the older classification is given here for what it is worth:

ALGONKIN POTTERY

(1) Globular-shaped.
(2) Pointed or conical bases.
(3) Broad, low neck, with flaring rim, or no neck and straight or slightly contracted rim.
(4) Coarse texture.
(5) Stone tempered.
(6) Manufactured by coil method, paddle-and-anvil method, or by a conjunction of both methods.
(7) Simple geometric patterns incised or imprinted with cord or fabric decorations.
(8) Inferior ware.
(9) No painted surfaces or designs.
(10) No life forms.

IROQUOIAN POTTERY

(1) Globular-shaped.
(2) Rounded bases.
(3) Slightly restricted neck, with overhanging or incurved rim; or square mouths, with pointed corners and sagging margins.
(4) Fairly smooth texture.
(5) Shell and stone tempered.
(6) Manufactured by coil method.
(7) Curvilinear and rectilinear, geometric, punched, or stamped designs.
(8) Superior ware.
(9) No painted surfaces or designs.
(10) Life forms frequently modeled on sides or rims of vessels.

VIII. POPULAR FALLACIES CONCERNING THE AMERICAN INDIAN

The North American Indian has figured largely in the conquest, history, and expansion of the United States. It is not surprising, therefore, that he has become a somewhat legendary person, cursed and denounced as being a cruel, bloodthirsty, dirty, and lazy ogre by some; defended and extolled as being a chivalrous, kindly, noble red man by others. Needless to state, neither conception is correct or fair. Indians are human beings with all their faults and virtues. Some were undoubtedly dishonest, cruel, and war-like; but in many instances the Indians had to resort to cruel, retaliatory raids, in order to defend themselves, their families, and lands from an ever-increasing flood of white settlers who were determined to grab what lands they could and to push the Indian off the map.

Therefore, it may be interesting as well as profitable to examine a few of the popular but incorrect ideas concerning the American Indian, his way of living, his philosophy, and the implements which he has left behind.

It was the custom of some Indian tribes to deform their heads by artificial means. Very often such deformation was unintentional and was caused by a hard cradle board which pressed against the skull of the infant. In other instances, the forehead was intentionally flattened by means of pressure from a board or by means of bandages or wrappings. Intentional head-flattening was probably practised because it was the custom to do so and because the result was considered smart, fashionable, and becoming. However, it has been stated that this custom was practised so that the Indians could spy from behind trees or peek over logs without displaying their heads as a target

for the enemy to shoot at. Such a notion is manifestly absurd.

Stone drill points, described on page 66, are sometimes called hairpins. It is extremely unlikely that the drills which are to be seen in many private and public collections were ever used in that manner. Their function was for boring holes.

One often hears that arrowheads and spearheads were chipped by means of fire and water. As stated on page 50, such a method would be positively disastrous and would not produce any sort of implement.

The Indians possessed no secret process for tempering copper. They did harden it somewhat by beating and pounding it.

Legend has it that the American Indian was taciturn. Doubtless some Indians were reserved, but, on the other hand, many of them were gay, friendly, fond of jokes, and talkative.

It is sometimes stated that an Indian suffered less from torture than a white man would. Such an idea arose from the accounts of early travelers who related blood-curdling tales of the various torments which Indian braves underwent in ceremonies. Many of the ordeals required by tribal custom were painful. They were borne uncomplainingly, not because the victims enjoyed being tortured or because they were incapable of feeling suffering, but because they were proud to exhibit self-command and personal strength in this manner. It is to be remembered that among certain religious fanatics in the Old World it was also customary to show one's fortitude as well as utter contempt for pain by various sorts of self-torture. Therefore, such stoicism was a matter of training, pride, and philosophy rather than insusceptibility to or liking for torture.

Indians were supposed to possess extraordinarily keen senses which enabled them to see farther, and hear and smell better than could whites. Such differences are probably more imaginary than real. Tests have shown that keen vision may be largely due to practice in interpreting familiar objects. The same may be said of hearing and smelling. Special interests and training would account for many of the feats of the Indians in hearing and smelling. White people who have lived with the Indians for many years have developed as keen a sense of vision, hearing, and smelling as the Indian was supposed to enjoy.

It has often been stated that Indian men were lazy and allowed the women to do all the hard work. Among most tribes the division of labor was strict and fair. To the women fell the duties of caring for the children, tending the crops (where agriculture was practised), cooking, erecting the habitation, preparing skins, and making basketry and pottery (where pottery was made). To the men were allotted the tasks of hunting, fishing, trapping, defending the camp, and making war, all of which were dangerous, exhausting, and time-consuming duties.

All sedentary groups of Indians were supposed to have been agriculturists. However, the sedentary tribes who inhabited the Pacific coast region did not practise agriculture, but subsisted on roots, berries, acorns, fish, and game.

In addition to these more common fallacies concerning the American Indian, a few more have recently been pointed out by C. Amsden:

A mysterious race lived in America before the Indians came. Races of giants and pygmies once lived in North America. Disease and illness were almost unknown in ancient times. Every scratch made by primitive man

has a meaning; every figure or design created by him, a symbolic meaning. Indian pictographs are a system of writing which will one day be deciphered and tell wonderful tales. All Indians understand and frequently use the expressions *How! Ugh! papoose,* and *squaw.*

Most of these ideas have sprung from ignorance, garbled stories, or misunderstanding and misinterpretation of Indian customs and manners. Needless to state, they are incorrect. However, because many of the ideas given here are embodied in novels, poems, and essays about the American Indian, and because it is often difficult to know which is fact and which is fancy, these fallacies and erroneous impressions are submitted. It is hoped that these explanations will aid in branding these legends as false and in expunging them from people's minds.

IX. EXPLANATION OF HALL OF NORTH AMERICAN ARCHAEOLOGY IN FIELD MUSEUM

The exhibits in Hall B, devoted to North American archaeology, have been arranged and grouped so as to illustrate the archaeological material from most of the culture areas described in chapter II. No attempt has been made to distinguish between that which is very old and that which is less so.

In visiting this hall one should start from the southwest corner, near which the model of an Illinois mound stands, and first examine the material on the right or south side of Hall B; then cross over and examine the exhibits on the north side of the hall proceeding from east to west. This will bring one back again to the west entrance of the hall, and a complete circuit will have been made.

All cases on the entire south side of the hall, as well as one in the northeast corner, are devoted to collections from Area 11, the Mississippi-Ohio area (see Map, p. 19). The arrangement is as follows:

Case 1.—Grave of Illinois Mound-builder (against west wall).

Case 2.—Stone agricultural implements, arrowheads and spearheads, drills, problematical objects, and potsherds from southern Illinois.

Case 3.—Stone celts, axes, knives, scrapers, fleshers, tobacco-pipes, beads, and problematical objects from southern Illinois.

Cases 4 and 5.—Painted and unpainted pottery from southern Illinois and northern Arkansas.

Case 6.—Painted and unpainted pottery from Arkansas.

Case 7.—Ornaments of skull and bone, ear-plugs, tobacco-pipes, arrowheads and spearheads, knives, and scrapers from Arkansas.

Case 8.—Drills, knives, scrapers, arrowheads and spearheads, pottery, and problematical objects from eastern Missouri.

Case 9.—Pipes, bear-tooth ornaments, mica objects, and necklaces of pearls, shells, and bone beads; copper celts, ear-plugs, ornaments, and head-dresses from the Hopewell Mounds, Ohio.

Case 10.—Model of Serpent Mound, Ohio.

Case 11.—Ceremonial blades of obsidian, large chipped flints, quartz artifacts, potsherds, bone and copper bead necklaces, pipes, textile fragments, and bone tools from the Hopewell Mounds, Ohio.

Leaving the Mississippi-Ohio area and proceeding westward along the north side of Hall B, the following cases illustrating material from other culture areas are encountered:

Case 12.—South Atlantic area (area 12). Arrowheads and spearheads, problematical objects, and pottery.

Case 13, east half.—North Atlantic area (area 8). Arrowheads and spearheads, knives, scrapers, potsherds, shell necklaces, bone tools, stone celts, and gouges.

Case 13, west half.—Iroquoian area (area 7). Arrowheads and spearheads, knives, scrapers, tobacco-pipes, and potsherds.

Cases 15–18.—Great Lakes area (area 6). Material from Michigan, northern Indiana and Ohio, northern Illinois, and Wisconsin; copper implements, including fishhooks, punches, celts, gouges, arrowheads and spearheads, chisels, beads, awls, knives, and harpoons; also

stone objects, such as arrowheads and spearheads, drills, knives, scrapers, celts, grooved axes, tobacco-pipes, problematical objects, adzes, spades, and hoes; also potsherds and shell ornaments.

Case 19, east half.—Northwest Coast area (area 3). Stone adzes, chisels, hand-hammers, and pile drivers.

Case 19, west half.—Columbia-Fraser Rivers area (area 4). Small agate arrowheads, spearheads, drills, scrapers, knives, and stone sinkers.

Case 20.—California area (area 9). Shell beads, fish-hooks, dishes, bone wedges and chisels, digging-stick weights, problematical objects, knives and scrapers, tobacco-pipes, baking slabs, mullers, ceremonial blades of obsidian, charm stones, pestles, and steatite bowls.

The Arctic, Canadian, and Plains areas are not represented, since the archaeological material is so scanty; and the Southwest area is omitted, because it is represented in Hall 7.

Case 21.—This case, in the entryway of the hall, contains a special, synoptic exhibit that is designated "Distribution of types of archaeological objects in North America." The purpose of this exhibit is to illustrate some of the important types of artifacts found in North America and to show by means of special maps the distribution of each type or group of objects. In each instance the term for an object is given, with synonyms if any. No reference is made to use, because this is explained on the labels in the other exhibition cases.

The purpose of the Hall of North American Archaeology is not merely to exhibit the handiwork of the North American Indians, but to illustrate their history as well as their methods of living as worked out under various geographical and cultural environments. The collections

on display were not gathered solely because of interest in the objects themselves. They were acquired with great effort and at much expense in an attempt to save from destruction the priceless and imperishable remains of peoples who left no written records, because it is from these concrete remains that the history of the Indians may be reconstructed. Collecting specimens because of their beauty or rarity rather than because of their inherent historical value is no better than collecting stamps. What is worse, if such collections are undocumented and uncatalogued, many valuable historical data are forever lost.

Therefore it is hoped that this exhibition of prehistoric North American material will aid the public in obtaining a historical perspective of the American Indian; and that it will stimulate those who possess or collect archaeological specimens without records or facts as to where, how, and when found, to gather henceforth all information possible about the material already housed in their cabinets, and to make no further addition to their collection unless everything concerning its history is known and vouched for. Further, it often happens that after a collector's death his collection is divided among uninterested people or may even be cast away. If the collection should chance to be presented to a museum or university, it is often worthless because the specimens are not accompanied by any information. If the specimens are worth collecting and saving, they are worth taking care of; and provision should be made to have them left to an institution where they will be catalogued and preserved and where they will help future students and collectors.

GLOSSARY

Annealing copper. A process whereby copper is made more elastic, tougher, and less brittle by heating it and then plunging it into cold water.

Arrowhead. The sharp-pointed, detachable end of an arrow, generally two to two and one-quarter inches long. Specimens longer than this may have served as knives or spearheads.

Artifact. Any object manufactured by human beings; applied especially to distinguish between natural objects and those made by human workmanship.

Ax, stone. A sharp-edged implement made from some hard, resistant stone, provided with a groove near the top for hafting, and used for cutting or possibly killing purposes.

Ax, fluted stone. An ax with one or more parallel grooves or flutings, which may be longitudinal or diagonal. These flutings served no purpose so far as is known, and were probably ornamental.

Banner-stones (Fig. 5 *a*, *c*). See Problematical Objects.

Bar-shaped stones (Fig. 5 *b*). See Problematical Objects.

Bird stones (Fig. 5 *f*). See Problematical Objects.

Boat-shaped stones (Fig. 5 *d*). See Problematical Objects.

Butterfly stones (Fig. 5 *a*, *c*). See Problematical Objects.

Celt. An ungrooved ax of stone or metal.

Chert. An opaque, indistinctly crystalline quartz usually geologically older and somewhat lighter in color than flint proper.

Chunkey stone (Fig. 5 *e*). A circular-shaped stone, ranging in size from one to eight inches in diameter and from one to six inches in thickness, with flat, convex, or concave faces, used in a game called *chungke*, *chenco*, or *chunkey*.

Conchoidal. Having shell-shaped depressions and elevations.

Cone. See Problematical Objects.

Cupstone. See Problematical Objects.

Discoidal stone (Fig. 5 *e*). A disk-shaped stone with a double-convex or double-concave face; may have been used as a mortar or as a chunkey stone. See Problematical Objects.

Flint. An opaque, indistinctly crystalline quartz dark gray or black in color.

Gorget (Fig. 6 *a–d*). See Problematical Objects.

Haft. To supply with a handle.

Hardness of minerals. See Scale of hardness.

"Killed" pottery. Pottery with a hole punched in it is said to have been "killed," because the spirit of the vessel was supposed thereby to have been released.

Native copper. An almost pure copper found in nature and in many cases containing traces of silver and iron.

Patina. A patina is any compact, adhesive coating covering certain objects. This crust is formed by surface alteration due to aging. Patina does not necessarily imply great antiquity.

Pick-shaped stones (Fig. 6 *e*). See Problematical Objects.

Plummets (Fig. 6 *f*). See Problematical Objects.

Potsherd. Any broken piece of pottery or earthenware.

Problematical Objects. Term used to designate all aboriginal artifacts the exact uses of which are not known. This category specifically includes polished stone objects often called banner-stones, butterfly stones, bar-shaped stones, bird stones, boat-shaped stones, cones, cupstones, chunkey stones, discoidals, gorgets, plummets, pick-shaped stones, pulley stones, spools, spuds, tablets, tubes, and wing-shaped stones.

Pulley stones. See Problematical Objects.

Scale of hardness. Used to test the hardness of a substance by comparing it with a standard series of minerals of different grades of hardness. Herewith are given ten minerals arranged according to their increasing hardness (after Moh): (1) Talc (softest in scale). (2) Gypsum. (3) Calcite. (4) Fluorite. (5) Apatite. (6) Feldspar. (7) Quartz. (8) Topaz. (9) Corundum. (10) Diamond (hardest in scale).

Slip. A thin wash of fine, liquid clay applied to the surface of a vessel to give a colored coating (often white, red, or orange). Colored designs are then painted on the slip when dry.

Spearhead. Any projectile point over two and one-half or three inches long.

Spools. See Problematical Objects.

Spuds (Fig. 6 *g*). See Problematical Objects.

Tablets (Fig. 6 *h*). See Problematical Objects.

Tempered pottery. When pottery is made the potter often mixes with the plastic clay tempering ingredients, such as sand, pulverized rock, or shell. The use of some tempering material serves a very definite purpose. Pure clay, when baked, tends to crack. Hence, these tiny foreign particles check the progress of the flaws or breaks and prevent them from running in ruinous, straight lines.

Traits, cultural. A cultural trait is any single element or any individual part of human behavior or activities. For example, pottery-making is a cultural trait. Likewise, the use of bone wedges, of copper, of the throwing-stick, and of stone gouges may be termed cultural traits.

Tubes (Fig. 6 *i*). Sometimes used as tobacco-pipes. See Problematical Objects.

Wing-shaped stones (Fig. 6 *e*). See Problematical Objects.

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LAUFER, 1929 and 1931
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II. CULTURE AREAS IN NORTH AMERICA

DIXON, 1914 and 1928
GODDARD, 1924
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GRIFFIN (in manuscript)
HINSDALE, 1931
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Moorehead, 1922, 1929, 1932
Parker, 1920
Ritchie, 1932
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Simms, 1903
Skinner, 1919–20
Wintemberg, 1931
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III. INDIAN MOUNDS AND METHODS OF BURIAL

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Griffin (in manuscript)
Henshaw, 1883
McKern, 1928, 1930, and 1931 (2 books)
Moore, 1894
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IV. MANUFACTURE AND USES OF STONE ARTIFACTS

Baer, 1921
Cushing, 1895
Douglass, 1896
Fowke, 1894, 1896, and 1913
Holmes, 1919
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McGuire, 1892, 1894, and 1897
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V. MINING, MANUFACTURE, AND USES OF COPPER IMPLEMENTS AND ORNAMENTS

Cushing, 1894
Holmes, 1901
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Packard, 1892
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VI. BONE AND SHELL WORK

Beauchamp, 1901
Bushnell, 1906
Holmes, 1883
Orchard, 1929
Putnam, 1887
Speck, 1916 and 1919
Stearns, 1887

VII. POTTERY

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Gifford, 1926–28, pp. 353–373
Gilmore, 1925
Guthe, 1925
Harrington, 1908
Hawley, 1929
Holmes, 1886 and 1903
McKern, 1931, pp. 383–389
Willoughby, 1909

INDEX

Abrading, 50
Adena culture, 42
Algonkins, 26–29, 40
Amerind, 5
Annealing copper, see Copper
Arrowheads, beveled, 53
Atlantis, 6
Ax, and celt, differences between, 54; grooved, 20, 23, 29, 30, 34, 44; stone, used in experiments for cutting trees, 56–58; stone, time required for manufacture of, 54–56

Banner-stone, theoretical uses of, 60–61
Beads, discoidal shell, 84, 88; tubular shell, 84, 88; uses of, 84; wampum, 84
Beveled arrowheads, see Arrowheads
Bone, uses of, 80–81
Bow, composite, 13
Bow drill, 64
Burials, types of, 33, 38

Cahokia Mound, 45
Camels, indigenous American, 14
Catlinite, 25
Celts, 20, 30, 34
Chert, definition of, 49
Chipping process, 52
Chunkey stones, 61
Civilization, definition of, 17; time required for rise of highest American, 15–16
Coil method of making pottery, 92
Colors used in decorating pottery, see Pottery
Copper, analyses, 79; annealing, 72, 75; cold wrought, 72, 74; "drift," 71; experiments in working, 75–78; "float," 71; from Appalachian Mountains, 72; hardening, 72; methods of mining, 71; native, 69, 79; Copper, objects, age of, 74; ornaments, 44, 72, 74; tempering, 72; tools, 72
Crematory basins, 45
Crumbling process, 54
Cultivated plants of New and Old Worlds, see Plants
Culture, areas, 17–18; centers of, 34–35; definition of, 17; traits, 18; traits brought into New World, 12
Cutting trees with stone ax, see Ax

Dice, bone, 80
Diffusion of traits from Old World into New World, 13
Domesticated animals, New World, 12; Old World, 12
"Drift" copper, see Copper
Drilling, experiments in, 64–66; methods of, 64–66

Efficiency of stone ax as cutting tool, see Ax
Effigy mounds, see Mounds
Experiments, in drilling, see Drilling; in working copper, see Copper
Extinction of bison, camels, horses, sloths, date of, 15

Feathering of an arrow, 53
Flint, definition of, 49
"Float" copper, see Copper
Fluted axes, 26
Folsom, New Mexico, 14
Fort Ancient culture, 42
Fossil man in New World, 14
Fracturing, 50

Garden-beds, 25
Gold ornaments, 34
Gypsum Cave, 14

Hammerstones, 52
Hand drill, 64

Hardening copper, see Copper
Hopewell culture, 44; in Wisconsin, 40
Horse, 14
Houses, Eskimo, 20; on piles, 33

Incised designs on pottery, see Pottery
Indians, date of entry of into New World, 15
Iroquois, 26–28
Ivory tools, 20

Knives, 54

Lamps, stone, 20

Manufacture of stone axes, time required for, see Ax
Marriage proposal confirmed with wampum, 87
Mauls, 49
Moccasin, 13
Money, 88–90
Mongolians, affinities of Indians with, 8
Mounds, 24, 31, 36–37; antiquity of, 48; conical, 37; effigy, 25, 37; linear, 37; oval, 37; purposes of, 36; truncated, 46

New Stone Age in Europe, date of, 11–12

Paddle-and-anvil method of making pottery, 93–94
Pecking process, 50
Peopling of New World, 11
Perforating, 50
Pile drivers, 22
Pipe-stone, see Catlinite
Plants, cultivated, of New and Old Worlds, 13
Pottery, colors used in decorating, 98; designs, 99–100; distribution, 91; Eskimo, 91; methods of making, 92–98; regional characteristics of, 100–102
Problematical objects, definition of, 58; distribution of, 58
Pump drill, 65

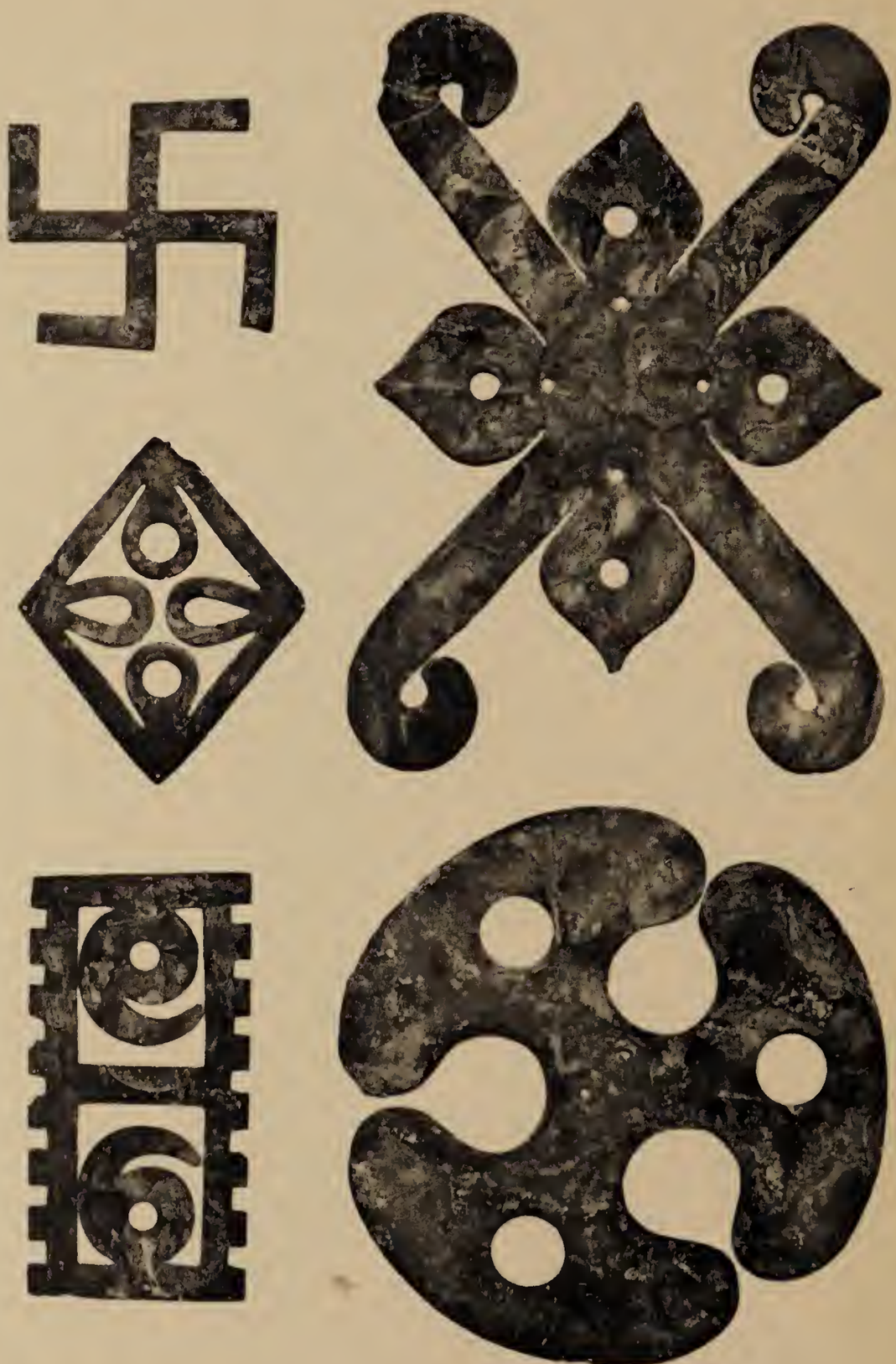
Racial characteristics of Indians, 7–8
Red-paint culture, 28–29
Rotary motion of arrowheads, 53

Shell, beads, see Beads; cups, 80; heaps, 33; money, 88–90; ornaments, 80
Sloth, ground, 14
Soapstone bowls, 29, 30
Stone used for artifacts, 49
Strap drill, 64

Tempering copper, see Copper
Traits, culture, brought into New World, see Culture
Truncated mounds, see Mounds

Wampum, uses of, 84–90; value of, 90
Wedges, stone, 22
Whalebone tools, 29, 30
Wood and wood-working, 21–22

EFFIGY TOBACCO-PIPE OF FIRE-CLAY (KAOLINITE), HOPEWELL MOUNDS, OHIO
Carved to represent a spoonbill duck on the back of an amphibian

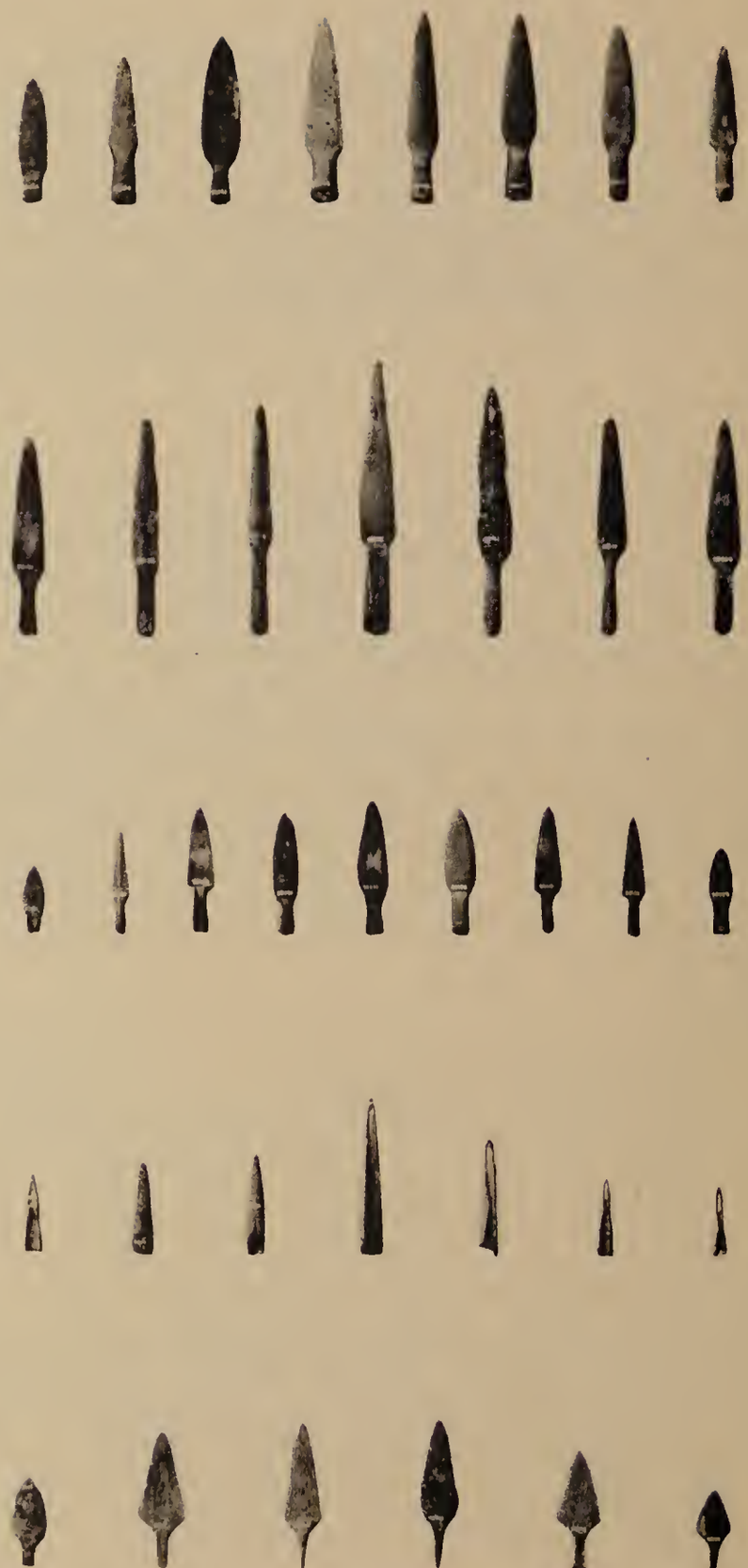


COPPER ORNAMENTS PERFORATED FOR ATTACHMENT
TO CLOTHING, HOPEWELL MOUNDS, OHIO

POTTERY FROM BURIAL MOUNDS, ARKANSAS

STONE AGRICULTURAL IMPLEMENTS (HOES AND SPADES), SOUTHERN ILLINOIS

COPPER IMPLEMENTS, WISCONSIN



COPPER ARROWHEADS AND SPEARHEADS, WISCONSIN

HOPI INDIAN WOMAN MAKING POTTERY BY COIL METHOD, ARIZONA

CARVED PORTION OF HUMAN FEMUR
HOPEWELL MOUNDS, OHIO